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The Diagnostic Approach of Three Disciplines to Minimal Intracranial Pathology in Children

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THE DIAGNOSTIC APPROACH OF THREE DISCIPLINES TO MINIMAL INTRACRANIAL PATHOLOGY IN CHILDREN

by

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LIFE

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

STATEMENT OF THE PROBLEM

Some of the most challenging diagnostic problems in the psychopathology of childhood are encountered in children with relatively mild forms of intracranial pathology. These children frequently manifest problems in a number of areas of adjustment and it is often difficult to assess the degree to which the organic brain disorder contributes to the child's lowered effectiveness in coping with his environment. In some children, intellectual growth and development continue unimpaired; in other children, mild to moderate mental deficiency or specific disabilities in memory, abstraction, or concentration may result. Emotional responses of organically impaired children may range from affective inertia to extreme restlessness, hyperexcitability, and hyperkinesis.

Minimal organic brain pathology in children exemplifies a group of clinical syndromes which Garner (1959, p. 39) has recently described as ". . . not very definitely or 'typically' established by clear-cut, mutually exclusive symptoms and signs." Garner reflects the findings of others (Ash, 1949; Ackerman & Behrens, 1955; Hunt, Wittson, & Hunt, 1953; Fiske, 1956; Mahlman, 1952; Masland, Sarason, & Gladwin, 1958; Perlman, 1957; Strauss & Lehtinen, 1947; Szasz, 1957; Wortis, 1956) that these syndromes result in a low degree of diagnostic agreement when the same patient is examined by

members of the same discipline. This lack of diagnostic agreement has led to a renewed research interest in the mental process of clinical diagnosis.

One of the most promising research techniques for the investigation of thought processes involved in diagnosis has recently been developed by Rimoldi and his associates at Loyola University in Chicago (Rimoldi, Devane, & Grib, 1958a). Thus far, the technique has been used primarily to investigate medical diagnosis. However, the basic rationale may be extended to other problem solving situations (Rimoldi, 1960a). Conceiving the diagnostic process as a special instance of problem solving behavior, Rimoldi et al. have studied the performance of medical school juniors, seniors, and staff physicians on several forms of a Test of Medical Diagnostic Skill (Rimoldi, 1955; Rimoldi & Devane, 1958b; Rimoldi & Devane, 1960b). The technique permits an analysis of the thought sequence of the subject in solving the problem, i.e., forming a diagnostic conclusion.

In the present study, the author has adapted the technique developed by Rimoldi and his associates to a different type of problem solving task, i.e., to the diagnostic problems presented by children with some form of minimal chronic organic brain disorder and to possible differences in diagnostic approach due to the professional training and theoretical orientation of the three disciplines that comprise the child guidance clinical team (child psychiatry, clinical psychology, and psychiatric social work). The primary purpose of this research is to determine the type of clinical information members of these three disciplines request in forming a diagnosis of organic brain disorder or some alternative diagnosis. The correctness or incorrectness of a diagnosis made by an individual subject or by a group of subjects

is considered important only insofar as it is related to the way in which the diagnosis was formulated by that subject or group of subjects. This study is not directed toward an assessment of the competence of social workers, psychologists, or psychiatrists in making a diagnosis of organic pathology although this factor may be related to the results obtained. Rather, the author is interested in whether the team members in a child guidance clinic differ in their mental approach to complex clinical cases of this type in ways that could be related to their professional training or theoretical frames of reference. There has been no previous research on the role of such differences in the diagnosis of minimal organic pathology.

The child guidance clinic provides an appropriate setting for the present study since 1) children with various (but often minor) forms of central nervous system impairment are frequently encountered; and 2) the stressful conditions which may influence the emotional adjustment of the institutionalized brain-damaged child are not present.

The author's rationale in this study represents an extension of Dr. Rimoldi's original technique to a type of problem solving situation in which the "correct" solution is at least partially dependent on the theoretical frame of reference and professional training of each group of subjects. The present investigation is exploratory and is not an hypothesis-testing experiment. As will be shown, the data have been analyzed by several new statistical methods which are currently being developed. The experimental design followed in this study is summarized in Rimoldi (1960a, pp. 451-458).

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Diagnosis of Organic Brain Disorders in Children

Numerous classification schemes have been set up to describe and systematize the etiology and development of organic brain pathology in children (Benda, 1952; Bender, 1956; Denhoff & Holden, 1951; Gesell & Amatruda, 1947; Sarason, 1949; Strauss & Lehtinen, 1947; Strauss & Kephart, 1955). Technical advances in the specialties of embryology, histology, pediatrics, neurology and psychology have resulted in increased knowledge of the role of prenatal, paranatal and postnatal factors in the developing child. The more severe forms or advanced stages of certain types of central nervous system pathology (e.g. cerebral palsy, multiple sclerosis etc.) present relatively few diagnostic problems in that the role of organic factors is fairly-well delineated in these disease entities (Benda, 1952; Denhoff & Holden, 1951; Doll, 1952).

When the diagnostician's task includes an analysis of the intellectual and emotional impairment consequent to brain damage, as in the instance of the child guidance team member, the lack of reliable criteria becomes apparent, especially in cases in which there has been relatively mild insult to the brain. In certain cases, electroencephalography, pneumoencephalography, roentgenography, biopsy or even autopsy have provided crucial diagnostic data in determining the existence, locus or extent of an organic brain disorder.

The results of the most objective of these measures--the autopsy--have recently been criticized (Angus, 1955, p. 143) as not representative of the neural complexities of the living, intact brain. Moreover, clinical demonstration that a lesion, tumor, or degenerative disease process exists does not always provide sufficient data from which to draw conclusions concerning the functional effects of such pathology. These factors suggest that one of the diagnostic problems involved in organic brain disorders is the kind and amount of clinical information members of disciplines with different professional training and experience consider necessary and sufficient to warrant a diagnosis of organic brain disorder. The theoretical frame of reference of the individual clinician may lead him to diagnostic conclusions that differ from other members within his own discipline as well as from members of different disciplines. The effects of professional training and experience as well as other clinician variables that may contribute to the unreliability of diagnostic conclusions will be considered more completely in the next section of this review.

The lack of adequate criterion to identify organic pathology is particularly evident in the minimally brain damaged child. These children present problems in differential diagnosis due to 1) maturational and developmental factors (Gesell & Amatruda, 1947; Strauss & Lehtinen, 1947); 2) compensatory mechanisms which offset cortical deficiencies or malfunctions; and 3) the overlap in symptomatology with other forms of pathology, notably endogenous (familial) mental deficiency, childhood schizophrenia and severe emotional disturbances (Benda, 1952; Bender, 1956; Masland, et al., 1958; Strauss & Lehtinen, 1947; Strauss & Kephart, 1955). The unreliability of the clinical

laboratory procedures outlined above without corroborative evidence following neurological or psychological evaluation is well known (Bradley, 1955; Strauss & Lehtinen, 1947; Masland et al., 1958; Sarason, 1949). On the other hand, the number of false positives and false negatives[1] identified by a combination of neurological and psychological criteria is too high to permit a reliable criteria for brain damage on the basis of these examinations alone (Goldenberg, 1955, p. 164; Sarason, 1949, p. 50; Masland et al., 1958, pp. 364-365). Moreover, the neurological and psychological sequelae of minimal brain damage are often not apparent in gross neurological functioning or in mental ability as evidenced in psychological tests. Rather, these sequelae may appear in learning deficiencies, specific intellectual disabilities (e.g. memory, abstraction, perception) or in a wide variety of nonintellective behavioral maladjustments including social and emotional immaturity. Wortis (1956, p. 206) maintains that the complexities of neurological, psychological and emotional dysfunctions in children with organic brain pathology make the phrase "brain-injured" child a meaningless one. He purports that there is a variety of brain-injured children whose problems are quite varied and whose condition calls for more refined analysis than some of the current generalizations of the brain-injured child provide. The selective and, at times, erratic behavioral impairment that is frequently observed in minimally brain damaged children has led Gallagher to raise some question as to the need for

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[1] False positives refer to those patients which any diagnostic screening device or technique identifies as belonging to a particular diagnostic classification, when, in fact, the patients do not belong to this classification. Conversely, false negatives refer to those patients which the same screening device identifies as not belonging to this diagnostic classification when, in fact, they do belong.

a medical diagnosis of brain damage when the solution to a child's problems may be more a matter of an adequate educational program than medical treatment (Cited in Masland, et al., 1958, pp. 372-373). Gallagher adds that the perceptual distortions, disinhibitions and problems of association that sometimes occur in certain types of brain damaged children are the proper province of the educator and psychologist rather than the neurologist. Gallagher is here in accord with Sarason's observation that ". . . most investigators have been far more interested in the problems of diagnosis of brain injury than in the significance of such a diagnosis for the handling and treatment of the child" (Masland et al., 1958, p. 366).

The general finding that ". . . similar degrees of (brain) injury to comparable areas may have different consequences in different individuals" (Sarason, 1949, p. 50) presents additional diagnostic problems in minimally brain injured children in that some areas of the brain are more adaptable to trauma (i.e., can better mediate compensatory mechanisms) than others. Age of onset, environmental factors and personality variables in the brain injured child may also vary the debilitating effects of organic pathology.

Strauss and his associates at the Cove Training Schools have attempted to assess the role of mild brain damage in the intellectual impairment of, and adequate school planning for, the mentally retarded child (Strauss & Lehtinen, 1947) and, more recently, the brain-damaged child of normal intelligence (Strauss & Kephart, 1955). Several authors (Bradley, 1955, p. 88; Masland et al., 1958, p. 374; Sarason, 1949, pp. 52-58) have questioned the applicability of Strauss and Lehtinen's criteria for a diagnosis of minor brain damage (1947, p. 112) to noninstitutionalized children. Sarason, for example,

suggests that at least part of the disturbed behavior evidenced by the institutionalized brain-damaged child may be due to such disruptive factors as "(a) separation from loved or familiar figures, (b) pressures to adjust to a completely new physical and interpersonal (peer and adult) environment, (c) confusion and resentment about their helplessness, (d) anxiety in relation to the future" (Masland et al., 1958, p. 374). The degree to which emotional factors lower the organically impaired child's effectiveness in coping with his environment may be obscured somewhat by the experience of institutionalization.

Finally, a number of problems other than those associated with the individual clinician frequently impede the acquisition of an accurate and reliable history about the patient. Garner (1959, p. 39) lists the incompleteness of data obtained in the history as probably the most significant factor in failing to diagnose adequately. Perlman (1957) and Sarason (1949) note the resistance of parents in divulging information that reflects on their adequacy as parents. Age of onset again presents specific problems in terms of the minute, detailed recall required in establishing an accurate developmental or medical history. The scope and the amount of detailed information in the history may constitute the difference between an accurate and an inaccurate diagnosis. However, as Angus points out (1955, p. 141), further research is needed to delineate those variables in the history which identify and characterize the form of an organic disorder rather than merely occur in association with or as a result of organic pathology.

The Diagnostic Process in Psychiatric Clinics

Most of the previous research on the thought processes involved in

diagnosis has been limited to an analysis of clinical judgment. Taft (1955) summarized the results of 81 studies on the ability to "judge" people and concluded that at least part of the wide discrepancies in the reported findings are due to different operational definitions of an adequate judgment, dissimilar purposes in the employment of judgment data, and the use of judges of varying levels of training and experience in different disciplines or fields of study. It seems appropriate to add that most of these studies have focused on the end products rather than the mental processes followed in diagnosis.

Some of the more common research techniques to assess clinical judgment are trait rating or ranking tasks, Q-sorts, personality descriptions or matchings, and pre- or postdiction of behavior from various sources of clinical information.

The degree of certainty a clinician places in his judgments was one of the first research questions asked about clinical judgment. Polansky (1941) requested a group of social workers to make behavioral predictions about their clients after reading the client's case history. The social workers were asked to rate how well they thought they knew the client after reading the case history. The results revealed no significant relationship between the degree of knowledge about the patient and accuracy in behavioral predictions, although the social workers tended to be wrong more frequently when they were certain about their judgments than when they were less certain. Recently, Phelan (1960) asked 20 Ph.D. psychologists with a minimum of two years of clinical experience to match 16 randomly arranged units or documents (four autobiographies, four TAT and four Rorschach protocols, four Holsopple-Maile Sentence Completion tests, four PMA tests, four Kuder-Preference Records,

and four Guilford-Zimmerman Temperment Surveys) with each of six patients observed briefly in a psychiatric interview. Results indicated that degree of certainty increased with increased experience, but in only 24 (6%) of 378 judgments did the psychologists feel very certain of their matchings.

Extending the question of degree of confidence in judgments from the diagnostic level of patient contact to the treatment level, Harway (1959) attempted to determine if therapists have different degrees of understanding of their patient's various needs. Harway asked nine psychiatrists with a minimum of two years of clinical training and experience to complete the Edwards Personal Preference Scale (EPPS). In consultation with each psychiatrist, Harway selected one adult patient from the psychiatrist's patient load. Although Harway attempted to secure a homogeneous group of patients in terms of age, sex, diagnosis, length of treatment, etc., ". . . only limited success was achieved" (Harway, 1959, p. 380). Six weeks later, the nine patients were given the EPPS. Simultaneously, but in another room, each psychiatrist was asked to complete the EPPS as he thought his patient was responding to it (labeled "codiction" in contrast to prediction or postdiction) and also to rate on a five point scale his degree of confidence that each of the responses would match his patient's response. While the results showed a positive relationship, only one of the obtained Q correlations between the patient's EPPS responses and his therapist's codiction of those responses reached significance. However, when the mean confidence rating of accurately codicted items was compared to the mean confidence rating of inaccurately codicted items by the chi square test, the former mean rating was significantly higher for seven of the nine therapists and the combined chi square probability was

less than .001.

Degree of confidence in an incorrect judgment has been viewed inversely as a possible measure of "projection" in evaluating clinical data. That is, the greater the confidence in a prediction that turns out to be erroneous, the greater the projection. Phelan (1960, p. 103) maintains that Polansky's data (1941) suggest that social workers may be somewhat more prone to project in their judgment of a person than psychologists since psychologists were less confident of their incorrect judgments. The data of Burke and Fiske (1957) lend support to this conclusion. Harway's results (1959) provide some evidence to indicate that psychiatrists are aware of what they know and what they do not know about their patients. On the other hand, Phelan's contention may be somewhat spurious in that the psychologists in his study were willing to rate only 6% of their judgments as "very certain", thereby tending to reduce the difference between confidence ratings of correct and incorrect predictions. Moreover, asking a clinician to rate his confidence in a prediction about a patient and asking a clinician to describe how well he knows a patient may call for different types of judgments. Harway's findings could be a function of variables present in the treatment process that are not present in the diagnostic process.

Another variable that may influence clinical judgments is the diagnostician's stereotype of the patient being judged. Daily (1952) has shown that premature conclusions can effect the acquisition of knowledge about a person. In a series of four experiments, Dailey found that elements of clinical information about a patient that differed with the judge's stereotype of the patient tended to be overlooked. Dailey's results also indicated that the

kind of clinical data upon which judgments were made was significantly related to the type of judgment that emerged irrespective of whether or not the judge had access to clinically more significant facts about the patient. This finding raises important considerations of the diagnostician's frame of reference and its influence on his diagnostic thinking. The relationships between stereotypes of patients and theoretical frame of reference are undoubtedly highly complex. In terms of the present study, it seems probable that both variables would contribute to the kinds of clinical information different disciplines or different members of the same discipline would consider necessary and sufficient to warrant a diagnosis of organic brain pathology.

Burke and Fiske (1957) attempted to assess the role of four VA clinical psychology trainee's stereotypes of the "typical anxiety neurotic" on their predictions of verbal and nonverbal Q-sorts by four male patients previously diagnosed as anxiety neurotics. The psychologists initially made the Q-sorts as they would for themselves and then as they thought the typical anxiety neurotic would sort the items. The psychologists made four subsequent Q-sorts of the items; one after obtaining each of the following kinds of clinical information about the patients: observation of patient behind a one-way screen; listening to a recording of an interview with patient; reading a verbatim transcript of the interview; and conducting a personal interview with patient. The patients then performed the same verbal and nonverbal Q-sorts. The predictive accuracy of the psychologists was not significantly influenced by the type of clinical contact with the patient. However, the personal interview resulted in a prediction of the patient's verbal sort that was significantly better than the psychologist's "stereotypic" sort. Intercorrelations of the

various sorts showed that the psychologists' stereotype of the typical anxiety neurotic significantly influenced their predictions of each patient's Q-sort. As in other studies (Shontz, 1956; Sines, 1959) the psychologists did not totally agree with each other on their stereotypes. Soskin (1959) asked groups of psychologists, psychiatrists, and student nurses to make two behavioral predictions about a patient. The first prediction made after learning biographical data about the patient. The second prediction was made after observing the patient in a role-playing situation or obtaining the patient's results on a combination or psychological tests (including the Rorschach) or obtaining the patient's Rorschach protocol alone. There are no significant differences in the accuracy levels of the first and second predictions for any of the groups of judges although the group obtaining the combination of psychological tests tended to be more "flexible" in their second predictions. It is interesting to note that the group obtaining only the Rorschach protocol (seven psychologists considered experts with the Rorschach) made significantly more changes between their first and second predictions (and in the direction of greater maladjustment) than any of the other groups, confirming an earlier study (Soskin, 1954) in which the interpretations of a set of purportedly "normal" TAT and Rorschach protocols by psychologists of varying levels of training and experience tended to become more pathological as the experience level of the psychologist increased.

In a recent well-controlled study, Sines (1959) investigated the relative contributions of four kinds of clinical information to an accurate diagnosis of 30 male VA outpatients and determined the extent to which knowledge gained from these sources of information improved the diagnosis of the patients over

a composite stereotype of the "mean average patient" in VA outpatient clinics which had been obtained previously. Five VA clinical psychology trainees performed four Q-sorts on items describing the personality characteristics and the psychiatric status of the 30 patients. The first sort was performed after learning biographical data about the patient. Between each of the other three sorts, the psychologists either a) obtained the patient's MMPI profile; b) administered the Rorschach to the patient; or c) conducted a personal interview with the patient. A criterion Q-sort was obtained from the patient's (subsequently assigned) therapist after a minimum of ten treatment interviews. Validity coefficients increased from an average of .289 to an average of .480 in the psychologist's successive Q-sorts. However, in some instances, the "mean average patient" sort provided a better prediction of the criterion sort than any combination of successive sorts, suggesting that a group stereotype may not be as distorted as individual clinician's stereotypes. The results of the Rorschach and MMPI protocols seemed to lower the validity coefficients in more cases than not. Validity coefficients increased with the amount of experience of each psychologist and the most advanced trainee made the best use of the various psychological tests. However, the personal interview and biographical data resulted in the highest validity coefficients of all the types of clinical information. The mean Pearson correlation between the diagnosticians and the therapists was only .48, ". . . suggesting that somewhat different frames of reference were emphasized by each" (Sines, 1959, p. 492).

Luft (1950) found that 20 psychiatrists, 28 psychologists, and 18 social workers were no more accurate than 28 physical scientists in predicting

each of two patients' responses on a sentence completion test following a personal interview. Luft concluded (1950, p. 758) that "Ability to predict seems to be a highly specific function which varies with the personality of the subject, the area of personality under investigation, the kind of prediction used, and the characteristics of the judge as well as his professional training." As a further explanation, Luft observed that " . . . the human organism is limited in its capacity to synthesize a large number of complex diagnostic indicators" (1950, p. 757). Hamlin (1954) concluded that differences in the complexity of the judgment task accounts for most of the well known disparity of results in studies on the accuracy of blind diagnosis from psychological tests.

One consistent finding in the studies reviewed above is the importance of biographical data about the patient in forming an accurate clinical diagnosis. An accurate medical and developmental history is particularly significant in cases of suspected intracranial pathology. In psychiatric outpatient clinics, obtaining an extensive and detailed case history is the almost exclusive province of the psychiatric social worker. However, as Hamilton (1947, p. 22; 1951, pp. 214 ff) points out, social workers often tend to have a "functional" orientation toward a patient's problem rather than a "diagnostic" orientation. Regensburg (1951, p. 235), for example, states that, "While the clinical diagnosis is helpful, it is not in and of itself the key to the treatment goal or to the method and techniques of choice in a family agency. For the caseworker the essential understanding is of the dynamic relation between behavior, feeling, and symptom formation

on the one hand and the client's reality problem on the other." Perlman (1957, p. 164) states that the social worker's " . . . problem solving task . . . (is) to determine how to best help his client." She goes on (pp. 171-180) to differentiate "dynamic" and "etiological" diagnoses from clinical diagnosis. Apparently social workers more readily accept the task of making a "social" diagnosis than a clinical diagnosis. Fanshel (1958) attempted to avoid the problem of clinical diagnosis by asking 60 psychiatric social workers for their ". . . 'opinions' rather than their 'judgments'" (1958, p. 544) about the "mental health status" of their clients. Fanshel's conclusion that "There was a close association between the caseworker's classification of the client's mental health status and the degree to which he saw personality factors operating to create the problem which the client brought for solution." (Fanshel, 1958 p. 549) would seem to leave unanswered the question of the effects of the social worker's stereotype of the client on the worker's opinion of the client. Perlman concludes (1957, pp. 180-182) that in casework, the social diagnosis of the patient cannot be separated from the disposition of the patient. Aside from the possibility that a functional orientation may impede the acquisition of a complete developmental and medical history of the patient, the implications of social worker's orientations toward diagnosis for the present study are that they may be somewhat less able than psychiatrists or psychologists to isolate and formulate a <u>diagnostic</u> conclusion about a patient as distinct from formulations about the disposition (e.g., treatability) of the patient.

In a recent symposium on the use of judgment data in social work research, Hunt (1959, pp. 39-43) summarized seven "types of fallibility in

clinical judgment" which he extended to apply to psychologists and psychiatrists as well as social workers. In addition to many of the problems outlined above, Hunt included biases resulting from the diverse roles of client and clinician in the diagnostic process, the frequent absence of external criteria to validate clinician's judgments, and the confounding effects of evaluation on processes of identification and quantification. The evaluative factor in the diagnostic process was investigated by Capell and Wohl (1959). The attending staff (three psychiatrists, eleven social workers, and two clinical psychology trainees) at a VA hospital case conference were asked to rate the patient under discussion on 20 dimensions. The dimensions had been derived previously from twelve concepts frequently used to describe patients, three dimensions known to load highly on an evaluation factor, and five typical psychoanalytic constructs. A centroid factor analysis was performed on the results of the ratings. Rotating the first factor through the locus of points defining the three evaluative scales showed that " . . . a number of clinical concepts have an evaluative meaning along with their diagnostic intent" (Capell & Wohl, 1959, p. 52).

A final source of confusion in the diagnostic process may be termed the unreliability of psychiatric diagnoses. Nosology, or the process of clinical labeling, presents specific classification problems in different practical situations (e.g., private psychiatric practice, mental hospitals, prisons, etc.) Szasz (1957) and Garner (1959) point to the inconsistencies in assuming that the same classification system should be useful in these diverse situations. A number of studies indicate that the currently

accepted psychiatric classification system (American Psychiatric Association, Committee on Nomenclature and Statistics, 1952) is unreliable both within and between psychiatric institutions.

Ash (1949) reported 45.7% agreement on major diagnostic categories among three psychiatrists' independent diagnoses of 52 adult patients. However, the psychiatrists agreed on only 20% of the specific diagnostic categories. Mehlman (1952) found no significant differences between numbers of patients diagnosed as a) organic or psychogenic or b) manic depressive or schizophrenic although each of the 4,026 patients had been assigned to one of 40 psychiatrists on a random basis. Mehlman concluded that some psychiatrists tend to use some diagnostic categories more frequently than others. Schmidt and Fonda (1956) determined that 80% of the major category diagnoses made by one of eight psychiatric residents on 426 state hospital patients were confirmed by one of three chief psychiatrists. However, agreement on specific diagnostic categories was found on less than half the cases. In a study of 804 psychiatric patients, Wallinga (1956) found that the diagnosis of patients staffed at more than one medical facility was more likely to change than the diagnosis of patients staffed and later restaffed at the same medical facility.

Hunt, Wittson, and Hunt (1953) reported that two teams of psychiatrists achieved 93.7% agreement on which of 794 men would be suitable for military service. However, the two teams had only 32.6% agreement on the specific clinical diagnoses of these men. In a later study, Hunt and Arnoff (1956) noted a similar trend in accuracy when 16 psychologists were asked to rank a set of Wechsler-Bellevue items for schizophrenic content at 3 and 18 month

intervals. These studies suggest that highly specific clinical judgments may be more reliable than psychiatric classifications.

Several investigators (Group for the Advancement of Psychiatry, Committee on Child Psychiatry, 1957, pp. 343-344; Hamilton, 1947, p. 20) have pointed out the inappropriateness of the APA Diagnostic Manual (1952) in child guidance clinics. Because children are in a state of growth and development, ". . . such classification is often difficult since the clinical entities are not clearly defined" (Group for the Advancement of Psychiatry, 1957, p. 343).

The role of clinical judgment and other variables discussed above in the diagnostic process in child guidance has not been empirically investigated. However, the findings of Ackerman and Behrens (1955), Dunkel, Johnstone and Smith (1957), the Group for the Advancement of Psychiatry (1957), Hamilton (Chapter 2, 1947), and Szasz (1957) suggest that most of the factors which differentiate the diagnostic conceptualisations of psychiatrists, psychologists, and social workers in other clinical settings are also manifested in the child guidance clinic.

Bradley has presented a convenient outline for categorizing the various kinds of clinical information that are routinely obtained by the child guidance clinical team in cases of suspected central nervous system impairment. As listed by Bradley (1955, p. 96), the categories are:

> (1) The distinctive (behavioral) patterns of the brain-injured child; (2) his performance on judiciously selected psychologic tests; (3) evidence in the past medical history of a presumptive cause for organic impairment; (4) corroborative evidence of cerebral lesions on neurological examination; and (5) electroencephalographic evidences of disordered cerebral physiology.

Each discipline in a child guidance clinic contributes information to one or more of these categories. Prior to a final diagnosis of the child at a staff conference:

> Each individual examiner arrives at some tentative hypothesis based on the data obtained from his specialized observations and studies which he evaluates within the framework of the knowledge of his own discipline. From his own point of view he collects and objectively describes his findings, summarizes them into generalizations and sifts out any inconsistencies. Within the structure of his theoretical concepts, he searches for correlations between the child's problems and his clinical findings, and he makes some speculations concerning dynamic and causal factors (Group for the Advancement of Psychiatry, Committee on Child Psychiatry, 1957, p. 342).

In terms of the primary purpose of the current study, this description of the diagnostic process highlights several possible sources of variation in the mental approach of the different members of the child guidance clinical team. These variations could be related to the way in which specific clinical information is selected and organized in formulating a diagnosis of organic brain disorder or in formulating some diagnosis other than organic brain disorder.

The design of the present research permits an analysis of the diagnostic approaches of psychiatrists, psychologists, and social workers as individual clinicians and as members of their respective disciplines. The design does not allow an appraisal of the way in which each discipline contributes to the final diagnosis at a staff conference. However, the diagnostic conclusion of any clinical team member is subject to modification (contamination) by verbal interchange with other team members at a staff conference. Through the use of a test of diagnostic skill, the original

(uncontaminated) clinical impressions of each team member may be assessed. The present study is based on the assumption that the unique contribution of each examiner (discipline) to the final diagnosis depends to a greater extent on his original clinical impressions than on subsequent discussion by the examiner at the staff conference.

The Test of Medical Diagnostic Skill

In a recent series of articles, Rimoldi (1955), Rimoldi, Devane and Grib (1958a), Rimoldi and Devane (1958b) and Rimoldi (1960a) have described a new technique for assessing medical diagnostic skill. Briefly, the technique consists of presenting a subject with a group of removable cards inserted in flat pockets on a display folder. The cards contain typed information about a patient. A phrase on the front (visible) side of the card identifies the type of data to be found on the reverse side. The subject is requested to solve the problem, i.e., reach a diagnosis, on the basis of the information contained on the cards. He is free to select as many cards as he needs, and in any order he prefers.

A similar technique was developed by Glaser, Damrin and Gardner (1954) working independently of Rimoldi and his associates. Glaser et al. have used the technique to investigate trouble shooting in electronics. Their approach differs from Rimoldi et al. in that a) the subject is instructed to solve the problem in the most economical manner, b) emphasis is placed on obtaining the correct solution, and c) several possible "diagnoses" are given to the subject at the end of the test by the multiple choice technique.

Rimoldi's technique has been developed primarily to study the mental processes in problem solving, principally those involved in medical diagnosis.

However, the basic rationale is applicable to other problem solving situations or to situations for which a known solution or "correct" answer does not exist (Rimoldi, 1960a). The adaptability of the technique follows from the fact that it permits an analysis of the way in which a subject attempts to solve a given problem. Tabor (1959) used the technique to investigate the thought processes involved in blind diagnosis by the Rorschach. Studies in progress include research in chemistry and in the influence of personality variables and theoretical orientation in evaluating different kinds of clinical data.

Rimoldi and his associates (1958a; 1958b; 1959a; 1959b) have devised several scoring methods for this technique. One measure is a frequency count of the number of questions (items) asked by a subject. A utility index has been established for each item in a test and for each group of subjects. The utility index is defined as ". . . the ratio between the number of times that the item has been selected and the number of subjects in the group" (Rimoldi, et al., 1958a, p. 4). The average of the utility indexes for all questions asked by a subject constitutes his utility score, which can be compared with other subjects in his group or with an analogous score made by experts. When the cumulative utility indexes of the successive items selected by a subject are plotted, a curve which characterizes the subject's performance results (Rimoldi et al., 1959b). This curve can be compared to theoretical or empirically derived "maximum" and "minimum" efficiency curves for a given group of subjects. A method of statistically analyzing the pattern of items a subject selects or disregards has also been developed (Rimoldi & Grib, 1959a).

Rimoldi (1960a) has summarized the performance of junior and senior medical students and a group of experienced physicians on the Test of Medical Diagnostic Skill. Results based on students and instructors in four medical schools indicate that both juniors and seniors ask more questions than experienced physicians, although juniors ask more questions than seniors. Seniors are more homogeneous than juniors in the items they select but less homogeneous than experienced physicians. The groups do not seem to vary in the number of questions they ask about physical and laboratory data, but the number of questions related to interview and clinical history decreases markedly and consistently with increased clinical experience.

In contrast to the reported lack of agreement among psychologists on the relative diagnostic importance of various kinds of clinical information (Daily, 1952; Burke & Fiske, 1957; Sines, 1959), a factor analysis of the results of experienced physicians on the Test of Medical Diagnostic Skill (Devane, Rimoldi & Haley, 1959) showed high agreement on the relative importance of the various items on the tests.

Summary of Implications for Present Study

The above review of the literature indicates that children with some form of chronic minimal intracranial pathology constitute a continuing diagnostic challenge to the child guidance clinical team since criteria for differential diagnosis are not available or lack satisfactory reliability. In the preceding sections, it has been shown that such children may be appraised in different ways by different disciplines in various clinical settings. It seems probable that these variations in clinical appraisal are at least partially influenced by a given discipline's professional

training, theoretical orientation, and defined role within the structure of a particular clinical setting. The diagnostic impressions of each team member lead to a diagnostic conclusion at the staff conference. But if psychiatrists, psychologists, and social workers differ in their diagnostic impressions of what constitutes an organic brain disorder or disagree on the functional effects of organic pathology, the clinical disposition of the case may not take into account the child's diminished potential to profit from therapeutic endeavors. There is little question that clinical diagnosis is an ongoing process subject to further evaluation, revision, and correction as the child progresses through a treatment program. This is not to say, however, that the original clinical diagnostic procedures with minimally brain damaged children cannot be improved.

It is the author's contention that the question of accuracy of diagnosis in complex clinical cases of this type cannot be completely answered until more empirical evidence of the actual mental processes followed by each discipline in forming a diagnosis is available. If the members of these disciplines differ in their theoretical orientations toward such cases and in their individual and composite thinking in such variables as clinical stereotypes of the minimally brain damaged child, degree of confidence in clinical judgments with or without corroborative evidence from other disciplines, evaluative meanings of the term organicity etc., such differences may emerge in problem solving tasks constructed from actual clinical cases of minimally brain damaged children.

Previous investigators using the Rimolidi technique (Devane et al., 1959, Haley, 1960, Rimoldi et. al., 1958a, Rimoldi & Devane, 1960, Tabor, 1959)

have also employed diagnostic problem solving tasks based on actual clinical cases. Rimoldi (1960a) has outlined the experimental design for other problem solving situations in which the technique may be employed. In an earlier version of the same paper, the following statement is made:

> The problem of setting a criterion is a difficult one. Let us assume that we secure a sample of people all of approximately the same high ability and analyze their patterns of solution. What kind of an agreement exists between their performances? It may well be that all of these proceed in highly similar fashion or that there is no agreement among themselves. If this is so it would be a question of analysing carefully who are those who agree, and at a second stage in the investigation to find out why they agree among themselves and why they disagree with others (Rimoldi, H. J. A. Problem solving as a process. Chicago: Loyola Psychometric Laboratory Publication No. 5. June, 1958, p. 11). (Multilith)

The author has followed the experimental design indicated in this statement in the present study. Procedural adaptations of the Rimoldi technique in the current investigation are elaborated in the next chapter. Minor methodological variations necessitated by the purpose and by the exploratory nature of the present study are also discussed in detail.

CHAPTER III

PROCEDURE

Selection of Clinical Cases

The author's primary goal in selecting clinical cases of minimally brain damaged children and in constructing a test of diagnostic skill was to parallel the diagnostic procedures at a child guidance clinic as closely as possible.

The cases selected for the present project were obtained from the Institute for Juvenile Research (IJR) in Chicago. This clinic is the oldest and one of the largest child guidance centers in the United States (Child Guidance Procedures, 1937). The clinical procedures at IJR appear to be fairly representative of the techniques used in diagnostic child psychiatry.

Prior to, and independent of, the current study, the entire case records of 500 consecutive diagnostic applicants to IJR were reviewed by a panel of ten IJR staff clinical psychologists. If the question of organicity was specifically raised or discussed by the social historian, the examining psychiatrist or psychologist, or was indicated by the referral source or discussed at the staff conference by the moderator or any team member, the case record was set aside as a case in which organic factors might be involved. Approximately two thirds of the original applicants (332) actually completed the diagnostic procedures at IJR. Of this total, 118 cases were set aside by the panel of ten psychologists. Each psychologist's allotment

of cases was then read a second time by another psychologist on the panel. Each case in which there was "positive or suggestive evidence of central nervous system impairment" by the EEG, neurological, or psychological examinations was set aside. No cases were dropped as a result of this second review.

From this pool of 118 cases, the author's first task was to select those case records which would be representative of the diagnostic problems involved in minimal organic brain pathology. Consultation with Dr. Rimoldi regarding the economics of experimental procedure in The Test of Diagnostic Skill (1958a) led to an arbitrary decision to limit the number of cases to four. At this point, several problems of design became apparent. The present study is an investigation of the thought processes of different disciplines in the differential diagnosis between minimal organic brain disorders and other forms of pathology which may be confused with minimal organic brain disorders. Theoretically, the case record of at least one child whose presenting problems, behavioral reactions, educational adjustment, and psychological and emotional functioning are consistent with some mild form of intracranial pathology, but whose organic factors had been "ruled out" by one or more members of the examining team, might have been included for comparative purposes. However, a fairly extensive review of the literature failed to disclose a single diagnostic criterion or combination of criteria that would reliaby differentiate the minimally brain injured child from the cortically intact child. Sarason (1949, pp. 57-58; Masland et al., 1958, pp. 366-367), for example, concludes that the degree of overlap (false positives and false negatives) in all previous research comparing the

developmental histories, behavioral reactions, neurological functioning, and psychological performance of groups of brain damaged and non-brain damaged children is too high to permit positive identification of minimal organic pathology on the basis of differences in these areas. For the same reasons, the selection of four cases from the original 118 set aside by the panel of psychologists proved problematical in that no one diagnostic criterion consistently identified the organic pathology in all of the cases. To attempt to establish the base rate clinical incidence of chronic brain disorders at LJR, as Meehl and Rosen (1955) suggest, would presuppose a reliability of the diagnostic classifications in the APA Diagnostic Manual (1952) which the review of the literature suggests is not justified.

In view of these factors, a primary LJR staff diagnosis of chronic brain disorder (American Psychiatric Association, Committee on Nomenclature and Statistics, 1952, pp. 79-83) constituted a necessary but not a sufficient reason for the inclusion of a case in the present study. Thirty-two of the original 118 cases were so diagnosed. The author arbitrarily decided to select cases which demonstrated definite evidence of minimal organic brain pathology in any <u>two</u> of the following: psychological test evaluation, electroencephalographic evaluation, and neurological evaluation. In addition, certain restrictions were made as to age, sex, and any diagnosis the child might have received prior to LJR's diagnostic procedures. These criteria are discussed in detail below.

> <u>Age</u>: Evidence of central nervous system impairment may appear at any point in the development of the infant or child. However, the significance of this evidence depends, among other things, on the chronological relationship between its onset and the developmental and maturational level of the child. Strauss and Lehtinen

(1947, pp. 11-112) suggest that a diagnosis of mild brain injury on the basis of minor neurological signs may be made before the age of ten, but is made more definitively after the age of ten. Since many problems in affective adjustment also seem to emerge at this age, the author decided to limit the sample of cases to children between 8 and 10 years of age at the time of admission to IJR. This eliminated many younger and some older children.

Sex: Estimates on sex differences in the incidence of cortical impairment range from 2:1 to 3:1, boys more frequent. In the sample of 32 chronic brain disorders, the sex ratio was 23:9. The author decided to use three males and one female to approximate this ratio.

Psychological test evaluation: Goldenberg's exhaustive review of the literature on a wide variety of psychological tests that have been used to aid in the diagnosis of organic disorders failed to reveal a single sign in any one test or group of tests that reliably discriminates organic disorders from nonorganic disorders (1955, pp. 144-162). Hence, the only restrictions as to tests administered and test results were 1) that a Stanford Binet or WISC be used as a measure and that at least average intelligence be found (a lower limit of 85 was set in contrast to Goldenberg's lower limit of 80), and 2) at least one projective technique of research stature (e.g., Rorschach, Children's Apperception Test) was administered.

Although the restriction concerning normal intelligence might eliminate mental deficiency or severe autism as diagnostic guesses, it provides one check on the relatively minimal quality of the organic pathology.

Neurological evaluation: Although the value of a neurological examination in cases of suspected cortical impairment has often been questioned (Bradley, 1955, p. 84, p. 100; Group for the Advancement of Psychiatry, Committee on Child Psychiatry, 1957, p. 332), the inclusion of this examination in a problem solving task designed to show differences in diagnostic approach in cases of minimal organic pathology seemed warranted. Positive and negative neurological findings can be equally deceptive in masking the degree to which organic factors impair a child's mental, emotional and social maturity.

Electroencephalographic evaluation: Negative EEG findings are not uncommon in children with cortical damage (Bergman & Green, 1956; Masland et al., 1958; Sarason, 1949). However, Darrow's technique at IJR (1947) has often provided crucial evidence of certain forms of minimal organic pathology.

No previous diagnosis of chronic brain disorder: No case was selected in which a prognosis of cerebral palsy, meningitis, etc. had been made prior to the time the child was examined by IJR. This criterion again served as one check on the relatively minimal quality of the organic pathology.

The four cases selected were designated as Cases A, B, C, and D. Each child presented definite evidence of mild intracranial pathology according to the examining psychologist's qualitative evaluation of the psychological test date (the IQs ranged from 88 to 109). Each child's EEG was also indicative of definite organic brain pathology. The latter was confirmed in consultation with Dr. Darrow at IJR. The neurological examination was positive in only one of the four cases (Case D). Skull x-rays had been taken only in Case A (negative) and Case D (positive).

Construction of Test Items

The cards (items) from which a subject could gain clinical information about each of the four patients are given in Appendix I.[2] The selection and phrasing of these items were based on the following factors:

A. The broad areas of clinical information routinely obtained by each team member in a child guidance clinic as indicated in the literature (Child Guidance Procedures, 1937; Group for the Advancement of Psychiatry, 1957; Dunkel, Johnstone & Smith, 1957).

B. Consultation with an experienced IJR staff Psychiatrist, Psychologist, and Social Worker as to 1) the kinds of information usually sought by a social worker, psychologist, and psychiatrist when reading reports written by a member of his own discipline;

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[2]Appendix I lists the results of these selection and phrasing procedures which, along with the actual content of each item for each case, were later discussed in detail with Dr. Rimoldi. The author, of course, is solely responsible for how well these items and the information entered on each card actually represent the original diagnostic procedures with each case.

2) the kinds of information usually sought when reading reports written by other disciplines; and 3) how all of this information could best be presented in the present study.

C. Special reports found in one case record but not necessarily in any other (the last four items in Appendix I).

Note that the 62 items in Appendix I are divided according to their source in the original record, which is equivalent to their part in the current problem solving tasks.

All available information within the case record of each child pertaining to each of these items, with the exception of interpretive comments by the original examiners, was entered on the back of the appropriate card. Interpretive comments were withheld to control the contaminating effects discussed in the literature review.

It was assumed that if a subject selected a particular item, he wanted to gain certain knowledge about the patient in answer to a specific question. Since no a priori assumptions about the value of any type of clinical information were made, all 62 items were used in the construction of four display folders. Hence, the four display folders were exactly the same in appearance as Fig. 1 (p. 32) before the subject selected his first item.

The mother's verbatim description of the child's problems on the application blank was recorded on the first card (Item I). Factual statements were abstracted from the social history (Part I), the school report (completed by the child's teacher) (Part III), and from the reports of the examining psychologist (Part IV), and psychiatrist (Part V). Factual data from the reports of the examining neurologist and electroencephalographer, as well as whatever medical information was included in the original case

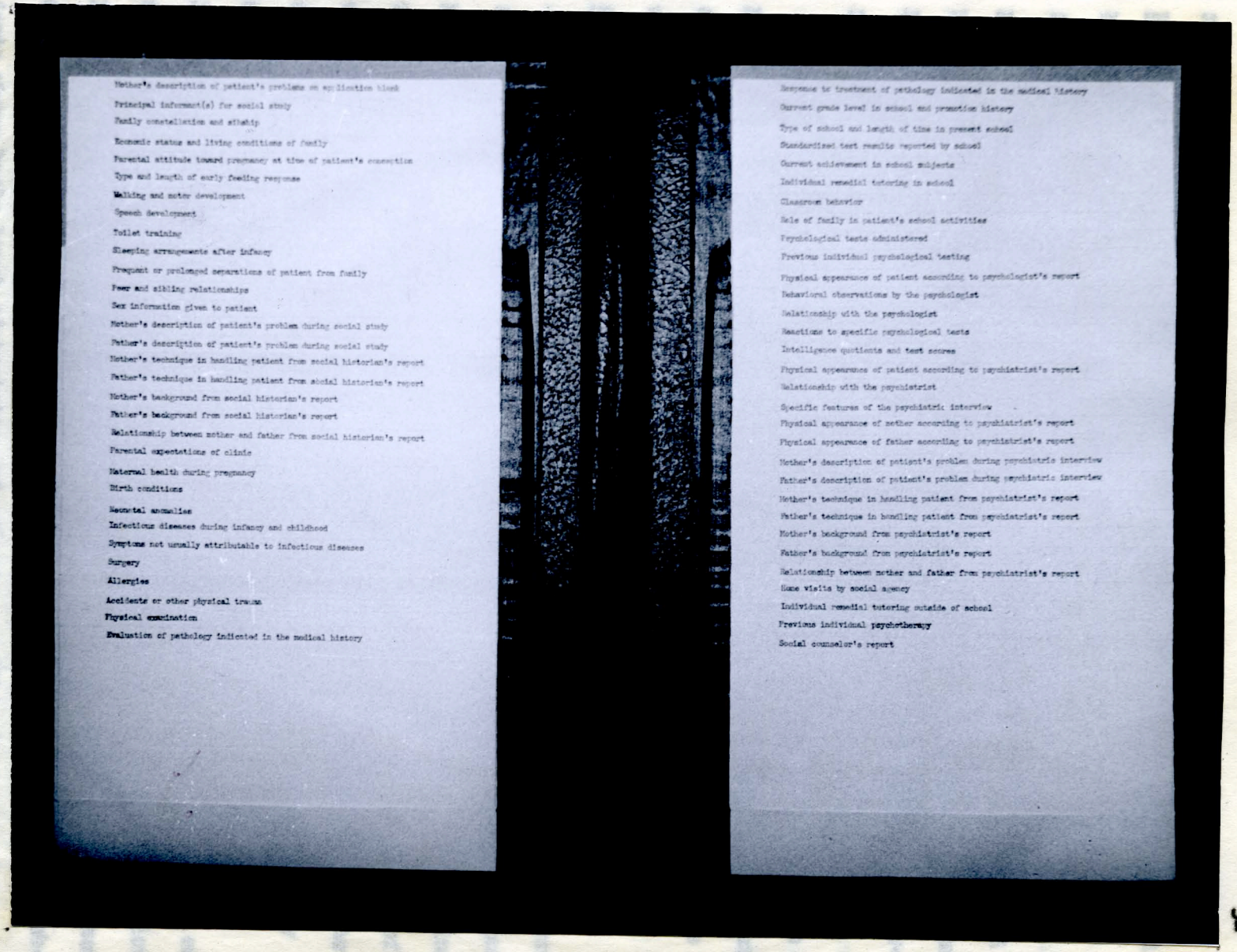

Fig. 1. Display Folder with Cards Inserted in Pockets

record, were listed in Part II. Since a card labeled EEG examination or Neurological examination would probably suggest that organic factors could be involved in each case, the results of these examinations were included in Item 31. Similar problems were encountered in listing the particular psychological tests administered in that different psychological tests had been employed. The titles of the tests administered were listed under Item 40 in each case. However, typed protocols of tests, reproductions of drawings, copied designs etc. were available if requested.

Another source of information that could be important to a subject is personal information about the original examiners. Thus, requests to examine a particular psychological test and questions about the original examiners were handled in a special way (see Methodology).

Subjects

Efforts to match groups of psychiatrists, psychologists and social workers in terms of experience, where professional training was obtained, etc. soon proved completely impractical as well as misleading. To equate two psychiatrists on the basis of the fact that they had a similar number of months of experience in the same agency, for example, would obscure the fact that one of the psychiatrists carried on an additional private practice exclusively with children, while the other carried on an additional private practice limited to adults. More significantly, the actual diagnostic evaluations of the four children in this study were performed by twelve examiners of various levels of training and experience in their respective disciplines. It seemed, therefore, more appropriate to obtain a somewhat heterogeneous group of subjects whose basic level of training and experience within their discipline was

at least equal to that of the original examiners.

All of the original examinations and interview (except the psychiatric interview) were performed by staff-level personnel at IJR. Although there are psychological interns and student social workers in training at IJR, none of the four cases was assigned to a student in psychology or social work. In the psychiatry department, on the other hand, most of the diagnostic interviews are conducted by psychiatrists in training at either the resident or fellow level. The psychiatric interviews in three of the four cases were conducted by residents; one was conducted by a fellow. Table 8[3] shows a comparison between the original examiners and the present sample in terms of sex and level of professional training.

Of the total N of 60 subjects in the present study, Table 8 indicates that the group of 20 psychologists were the most similar to the original examiners in terms of sex and level of training.

Two of the five psychiatric fellows were acting in the capacity of staff moderators on an irregular basis. Seven additional moderators were obtained to bring the level of training and experience in the psychiatry sample closer to those of the psychology and social work samples. However, the inclusion of eleven psychiatrists at the resident or non-moderating fellow level of training resulted in a somewhat lower overall number of months of clinical experience with children in the psychiatry sample (See Table 9).

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[3]All tables referred to in this chapter are located in Appendix II. To facilitate interdiscipline comparisons, the following abbreviations will be used: Psychiatrists (PI); Psychologists (PO); and Social Workers (SW).

Although an attempt was made to obtain subjects from agencies other than IJR, it was considered equally important to secure a relatively homogeneous group of subjects in terms of diagnostic experience with children and familiarity with the clinical diagnostic procedures in a child guidance clinic. In the psychiatry and social work samples, the author was not able to secure any subjects who were not currently associated with IJR with the exception of one psychiatrist and one social worker, both of whom had been trained at IJR. However, the possibility of an IJR "bias" was controlled to a certain extent by selecting IJR staff psychiatrists and social workers with previous training and experience in other agencies. Thus, in only four instances was a psychiatrist's clinical training and experience limited to IJR. Similarly, 13 out of the 20 social workers had received clinical training and experience in other agencies; seven of the 13 had worked in two or more other agencies.

Any member of the examining team on any of the four cases or any staff member having any connection with the current study (e.g., those who acted as consultants for the three disciplines) was, of course, excluded as a subject. In addition, any psychologist who had reviewed the clinical material in one of the four cases as a part of the earlier compilation of cases of suspected cortical impairment was eliminated. As a result, only seven IJR staff psychologists were able to participate as subjects in the present research. Table 10 lists the primary institutional affiliation of the 13 non-IJR psychologists, reflecting a somewhat broader clinical background in the psychology sample. All agencies are in the Chicago area.

Finally, it seems probable that a diagnostician's theoretical

orientation is influenced in part by the academic institution in which he received his professional training. Table 11 lists the formal professional training of the 60 subjects by discipline. This data is perhaps limited in meaning for the psychiatry sample, most of whom gained their psychiatric training in some agency other than their medical school. However, this does not mean that a psychiatrist's medical school background does not influence his theoretical preferences, particularly in cases of suspected central nervous system impairment. Several of the psychiatric moderators are in training at the Chicago Institute of Psychoanalysis, but only one had completed psychoanalytic training. Similarly, some of the social workers had completed the Child Care course at the Institute. These factors are not incorporated in Table 11.

Table 11 reveals a relatively wide scope of clinical backgrounds for the 60 subjects. The University of Chicago is strongly represented in the psychology and social work samples. The University of Illinois and Loyola University are also well represented.

The groups seem to meet the author's goal of securing subjects whose professional training and clinical background are somewhat varied, yet all of whom have had sufficient clinical experience to be familiar with the diagnostic problems involved in minimal intracranial pathology in children. It should be emphasized that no attempt has been made to obtain subjects from any one clinical agency or academic institution, since this would constitute a somewhat different research problem. The clinical cases themselves, on the other hand, were purposefully obtained from IJR to insure that some degree of similarity in diagnostic procedures had been employed with each

case. While a greater number of subjects from other agencies in all disciplines might have enlarged the applicability of the results, it was felt that such a decision could not be determined until the results of the present sample in each discipline were carefully analyzed.

Methodology

The four display folders discussed in the section on test items were presented individually to the 60 subjects by the author. The folders were made of cardboard and the cards measured 5 by 8 inches. As mentioned earlier, each display folder was similar in appearance before the subject selected his first item (see Fig. 1, p. 32).

The following instructions, modified from Tabor (1959, pp. 118-119), were used:

> Please do not remove any of these cards until asked to do so.
>
> This is a test to investigate your ability to evaluate clinical information for the purpose of diagnosis. It consists of four sets of cards, the first one of which is in front of you. These cards contain information abstracted from the case records of four children who were examined at a child guidance clinic. The information is arranged in the approximate chronological order of its entry in the case record and consists of statements from the application blank filled out by the parents, the psychiatric social worker's interviews with the parents, the school report filled out by the child's teacher, the examining psychologist's and psychiatrist's reports as well as any medical or other special evaluative data included in the original case record.
>
> Now, your task will be to select in the best order those cards that are necessary and sufficient to arrive at a diagnosis. Before selecting your first card, please read through the titles of all of the cards so that you know what information is at your disposal. (Pause)
>
> Do not select a card unless you really feel that it is necessary to help you formulate a diagnosis. However, you are free to select as many cards as you need and in any order you prefer. When you select a card, take it from the folder, read the

information that has been entered on the back of it, and then place the card in a pile here (E points). Any card that has been selected may be reread at a later point if necessary.

You may ask any question that occurs to you as you work. If you have questions concerning the individual examiners or wish to see the original psychological test data for any or all of these cases, these items of information will be made available.

You should attempt to state your diagnostic conclusion as soon as you have formulated it. If you have any question on how the diagnosis you have reached is stated in the APA Diagnostic Manual, you may look up the correct classification in this booklet.

As an introduction to each case, the age, sex, referral source, and chief complaint of the patient were given. If the subject requested information about an examiner, he was asked which items from the following areas might answer his questions: age; sex; race; nationality; marital status; professional training; internship or fieldwork; professional experience; certification, license, or membership in professional organizations; and personal analysis or individual psychotherapy. The same items of information were obtained from each subject at the completion of the test. Specific psychological test data were made available whenever the subject requested. The subject's performance on each case as well as any questions asked or comments made were recorded by the author. Fig. 2 (p. 39) illustrates the process of selecting a particular item of information about the patient in Case D from one of the display folders.

Tabor (1959) found that 30 Rorschach experts encountered some difficulty in attempting to formulate their clinical impressions into a specific diagnostic classification. To eliminate this source of error, Tabor recommended (1959, p. 108) that future researchers on the diagnostic process should provide the subject with a checklist of diagnostic categories in order to

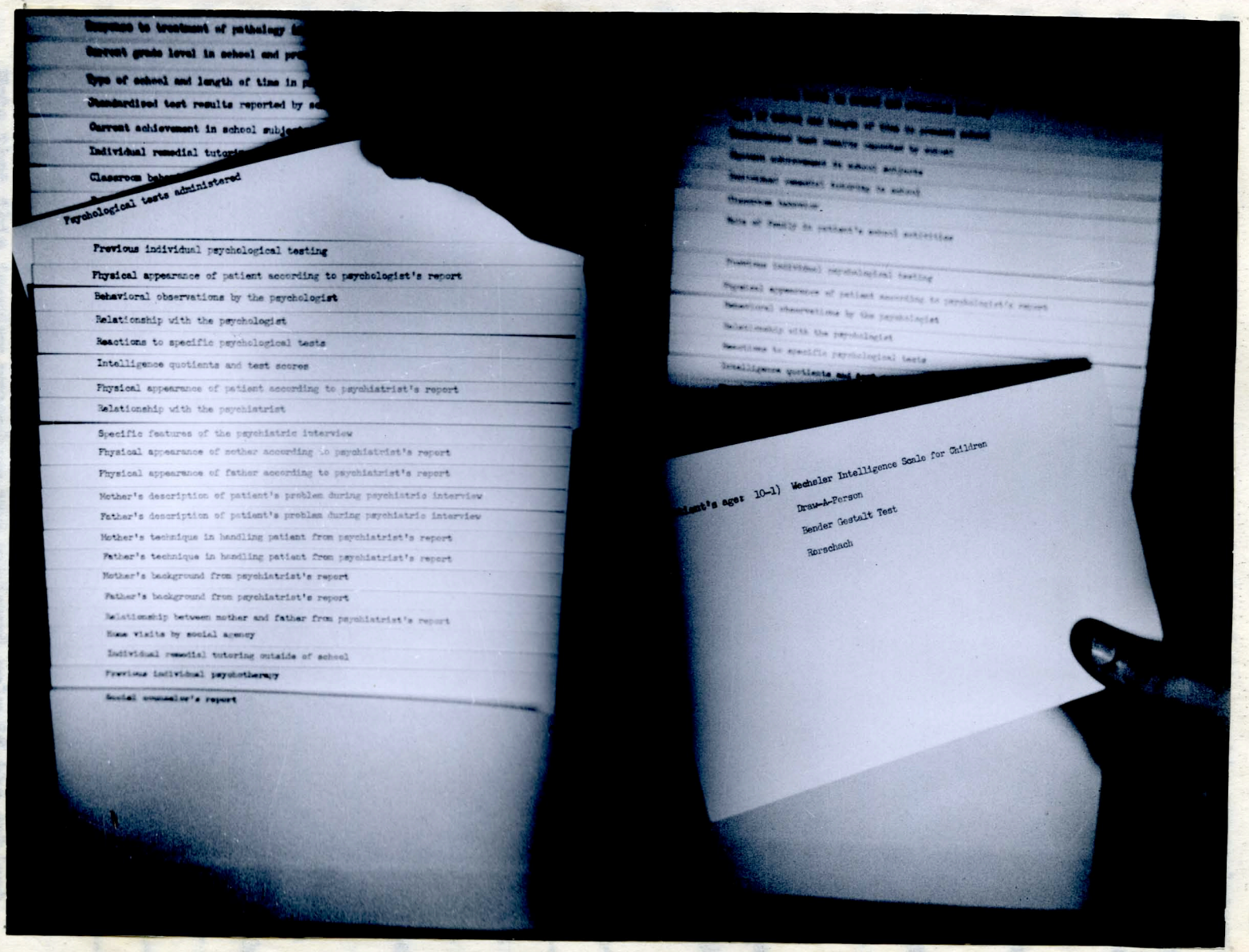

Fig. 2. Item Selection: Subject is Discovering Which Tests were Administered to Patient in Case D

classify the patient in some form of standardized diagnostic nomenclature. This suggestion seemed particularly applicable in the present study in view of the complexity of the diagnostic task. For Tabor, "An accurate diagnosis was specified as one conforming to a narrow range of closely related disorders" (1959, p. 86). An example especially pertinent to the present study was given on the next page (1959, p. 87). Tabor accepted as accurate a diagnosis of "organic" or "depressive" on the Rorschach protocol of a post-lobotomy patient. The present research design calls for a greater specificity of diagnostic conclusions. The Standard Nomenclature List of the APA Diagnostic Manual (1952, pp. 78-86), which is routinely employed at each IJR diagnostic conference, was used as a diagnostic checklist in the specific manner elaborated in the next paragraph.

Several subjects encountered difficulty in reaching a diagnostic conclusion in spite of (in some instances, because of) the diagnostic manual. Such subjects were encouraged to choose the one diagnostic category "that best summarized and characterized the child's major problem." A few subjects thought that some cases should be given a "double primary" diagnosis. A form of structured inquiry was then employed in which the subject was forced to select one of the two diagnostic categories. In any diagnostic conclusion in which organic factors were specifically mentioned as "possibly contributing" to the child's maladjustment, but were considered secondary to some nonorganic cause, the subject was further questioned on the possibility that the organic factors alone could account for the observed pathology, unless the subject directly specified that this was not probable.

Note that this inquiry procedure was employed only if the subject

verbally expressed confusion or indecision in stating a final diagnosis due, specifically, to "possible" organic factors. If the subject discounted the importance of organic factors or did not mention them, no inquiry was made. However, all diagnostic conclusions were recorded in APA psychiatric code numbers to eliminate confusion in scoring.

After the diagnosis of each case, a subject was asked to rank order all of the items he had selected in terms of how much each item had actually contributed to his final diagnosis. This ranking operation was labeled RII in distinction to the actual selection of items from the display folder, which also constituted a ranking of the items.

After diagnosing all four cases, each subject was asked to rank order Case A, Case B, Case C, and Case D in terms of their relative diagnostic difficulty or complexity. This ranking was labeled RIII.

Statistical Analysis of the Data

The data were analyzed according to the scoring methods reviewed under the section on the Test of Medical Diagnostic Skill in the preceding chapter. Utility indexes were computed separately for each discipline for each case. The contaminating effect of each subject's contribution to his own utility score was corrected by Formula (9) (Rimoldi, et al., 1958a, p. 31). Efficiency curves (Rimoldi, et al., 1959b) were drawn to characterize the performance of 1) all three disciplines on each case and 2) each discipline on all four cases. A pattern analysis (Rimoldi & Grib, 1959a) was carried out on each discipline's performance on Case A.

The quantitative and qualitative results obtained in this investigation are presented and discussed in the next two chapters. Emphasis has been

placed on the ways in which each discipline selected and organized clinical information in reaching a diagnostic conclusion about each child.

CHAPTER IV

RESULTS

Number of Cards

Table 1 presents the mean and standard deviation of the number of cards (items) selected by each discipline in each of the four cases.[4]

Table 1

Means and Standard Deviations for the Number of Items Selected

Discipline	Case A		Case B		Case C		Case D	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Psychiatrists	40.35*	15.75	23.60	15.10	29.60	14.40	26.80	15.70
Psychologists	30.05	14.30	20.30	12.60	24.65	12.15	23.10	13.60
Social Workers	34.15	12.10	24.00	13.05	27.60	12.45	27.40	12.10

* $p < .05$

The F ratio showed no significant differences in the dispersion of the number of items selected, suggesting that the three disciplines were relatively homogeneous in the amounts of clinical information they required

[4] Unless otherwise specified, all interdiscipline comparisons excluding the F ratio are for a two-tailed test of significance.

to reach a diagnosis.

A *t* test analysis revealed that the only significant interdiscipline difference in the mean number of items selected was between the psychologists and psychiatrists in Case A (the significantly higher value is starred in Table 1). This difference is difficult to interpret for several reasons. Firstly, since both inter- and intradiscipline differences diminish in Cases B, C, and D, it is possible that each discipline's performance in Case A may be somewhat independent of the other three cases. Conceivably, this independence could follow from the nature or difficulty of Case A (this point will be further elaborated in the discussion of the relative diagnostic complexity of the four cases) or from the fact that Case A constitutes each discipline's first encounter with the technique used in the current problem solving tasks with minimally brain damaged cases. As such, Case A may discriminate interdiscipline differences in diagnostic approach to a greater extent than the other three cases, although the design of the study and the data do not permit this conclusion unequivocally.

A second factor which obscures the meaning of the significant difference between psychiatrists and psychologists in the mean number of cards in Case A (and which may partially account for the fact that the psychologists selected the lowest mean number of cards in all four cases) is the more concerted interest in and greater importance attached to the psychological test data (e.g., Rorschach, WISC, etc.) by psychologists than by psychiatrists or social workers. Thus, the fact that the psychologists selected the lowest mean number of cards in all four cases may not

necessarily mean that they required less clinical information to reach a diagnosis since their number of questions about the psychological test data is not reflected in the mean number of cards selected from the display folders (it will be recalled that the original psychological test data as well as information about the examiners were considered independent items of information in forming a diagnosis and were not listed on the actual display folder). This important point will be elaborated later.

What appears to be of more immediate significance in the analysis of the number of items selected is that in Cases B, C, and D, the psychologists tended to acquire almost as much information about the patient from sources other than the psychological test data as the psychiatrists and social workers. This finding is interpreted to mean that psychologists in general did not limit their diagnostic formulations to an appraisal of the psychological test data, but attempted to confirm their clinical impressions from the test data by checking information in the social, medical, and school histories and in the psychiatric interview. Analysis of individual performances showed this to be true of most but not all psychologists. The psychologists would ask more questions concerning the psychological test data than the other two disciplines was, of course, expected. But that the clinical impressions gained from the test data did not result in an underevaluation of other types of information (as indicated in the mean number of cards, with the possible exception of Case A) in comparison to psychiatrists and social workers, is noteworthy.

In terms of training and orientation, and disregarding levels of significance, it is interesting to note the relative similarity in the mean

number of cards for psychiatrists and social workers as contrasted with psychologists. However, the psychiatrists tended to be more variable in the number of cards they selected than both social workers and psychologists. In addition to the possibility of greater individual differences among the psychiatrists in the amount of clinical information considered necessary and sufficient to form a diagnosis, the relative heterogeneity of the psychiatrists may reflect their lower overall amount of clinical experience with children in comparison with the psychologists and social workers. In general terms, the latter would be in accord with the findings of Rimoldi and Devane (1958b) that more experienced clinicians tend to ask fewer questions about a patient than less experienced clinicians. However, as noted above, the interdiscipline variances in the number of items selected are not significantly different.

The differences in the mean number of cards for all disciplines in each of the four cases are discussed in the section on diagnostic conclusions in the next chapter.

Utility Indexes

The utility index of an item (Ui) is the ratio between the number of times the item was selected by a group of subjects and the total number of subjects in that group (Rimoldi et al., 1958a, pp. 4-5). It is one measure of the apparent or expected usefulness of each item in solving the problem, i.e., reaching a diagnosis, in the test of diagnostic skill. The utility index may or may not be related to the actual value of the item in terms of the diagnosis since its meaning is defined by the subjects in a particular group and different groups may ascribe different values to the same item.

The utility index of an item may vary between 1.00 (in which instance all subjects in a particular group considered the item necessary to reach a diagnosis) and .00 (in which case none of the subjects in a particular group considered the item necessary to reach a diagnosis). The degree to which the utility index approaches these extremes reflects the amount of agreement within a group as to whether an item should be selected or disregarded.

Table 12 (Appendix III) lists the utility indexes for all items for each discipline in each case.

The frequency with which a given item was selected by each discipline may be determined from Table 12 by multiplying the utility index of the item by 20. The items corresponding to the numbers in Table 12 should be obtained by reference to Appendix I.

Inspection of Table 12 discloses that some items were relatively useful to all disciplines in each case while other items were routinely disregarded by certain disciplines in one or more of the cases. A chi-square analysis (or, when that test was inappropriate, Fisher's Exact Probability Test) was carried out to evaluate interdiscipline differences in utility indexes for each item in each part of all four cases.

The items in which the utility indexes differed significantly between disciplines are given in Table 2, (p.48). The cell entries in the table indicate the discipline with the higher utility index in each comparison.

Significant interdiscipline differences were found in one or more cases for 30 of the original 62 items. Two trends are immediately evident in Table 2. With several isolated exceptions, it is clear that the disciplines differed most frequently on the apparent usefulness of certain items in the

Table 2

Items Differentiating Disciplines by Utility Indexes

(Cell entries show discipline with higher utility index)

Part	Item	Case A			Case B			Case C			Case D		
		PI-PO	PI-SW	PO-SW	PI-PO	PI-SW	PO-SW	PI-PO	PI-SW	PO-SW	PI-PO	PI-SW	PO-SW
I	1	PI*			PI*			PI*	PI*		PI*		
	2	PI**		SW**	PI*		SW*	PI*		SW*			
	3	PI*											SW*
	4	PI*											
	5	PI*		SW*						SW*			
	6	PI*											
	9												SW*
	10												SW*
	11							PI*					
	14	PI*		SW*		SW*	SW**		SW*	SW*		SW*	SW*
	15			SW*			SW*	PI*					SW*
	16			SW**			SW*			SW*		SW*	SW**
	17	PI*		SW*				PI*		SW*		SW**	SW**
	18			SW*			SW*	PI*		SW*			
	19			SW*			SW*						SW*
	20	PI*		SW*			SW**			SW*			SW*
II	24		PI*										
	31				PO*								
III	34	PI*											
	39												SW*
IV	40				PO*		PO*	PO*		PO**	PO*		PO**
	42		PI*	PO*									
V	47		PI*										
	48	PI**											
	49	PI*		SW*									
	51							PI*					
	56	PI*						PI*		SW*			
	57	PI*											
	58	PI*											
VI	62								SW*				

* $p < .10$

** $p < .05$

Social History (Part I) in forming a diagnosis. It is possible that items that differed in only one or two cases may reflect factors unique to those cases as well as differences attributable to professional affiliation. Nonetheless, it is extremely interesting to note that the kind of clinical information that most consistently differentiates the diagnostic conceptual approaches of the three disciplines comprising the child guidance team in cases of minimal intracranial pathology is very similar to the type of information (i.e., interview and history data) that characteristically differentiates students and physicians in medical diagnosis (Devane et al., 1959; Rimoldi & Devane, 1958b; Rimoldi, 1960a; Rimoldi & Devane, 1960b). These findings are in accord with clinical practice in that subsequent diagnostic procedures are often determined to a great extent by the evaluation of interview and history data. In the medical situation, differences between subjects have been shown to be attributable to level of training and experience. In the present research, on the other hand, there is evidence to suggest that differences between subjects are related to ways in which members of different disciplines select and organize clinical information in cases of minimal intracranial pathology.

Secondly, it should be noted that the differences shown in Table 2 are basically differences between psychologists and psychiatrists and between psychologists and social workers. In the total number of 79 comparisons yielding significant differences, psychologists differed with psychiatrists on 30 items and with social workers on 39 items. Psychiatrists differed with social workers on only 10 items. In general, the differences between psychologists and social workers were of greater statistical significance

(eight items beyond the .01 level) than the differences between psychologists and psychiatrists (two items beyond the .01 level).

With the exception of Items 31, 40, and 42, the psychologist's utility indexes for the differentiating items were significantly lower than those of psychiatrists or social workers. In the instance of Item 40 (Psychological tests administered), the higher value is obviously related to the greater interest of psychologists in the psychological test data. Selecting Item 40 usually constituted the first step in evaluating the test data (see Fig. 2, p. 39). It is interesting to note parenthetically that once psychiatrists and social workers discovered that Item 40 listed the tests but did not include an evaluation, their interest diminished accordingly.

Since all psychiatrists and all social workers were (or had been) affiliated with IJR in contrast to seven of the 20 psychologists, it might be hypothesized that the lower utility indexes for psychologists were due to differences between agencies in diagnostic procedures rather than to modes of diagnostic thinking that characterize psychologists as members of a particular discipline. The most explicit formulation of this hypothesis in terms of utility indexes is that IJR psychologists selected those items having significantly higher utility index values for psychiatrists or social workers more frequently than non-IJR psychologists.

To test this hypothesis, a one-tailed comparison of the frequencies with which the seven IJR and the 13 non-IJR psychologists selected each of the 62 items having a significantly higher utility index for psychiatrists or social workers (the items indicated in the first and third columns of each case in Table 2, except Items 31, 40, and 42) was made by reference

to a table of critical values for Fisher's Exact Probability Test (Siegel, 1956, pp. 256-270). None of the comparisons were significant at the .05 level and the above hypothesis was rejected. Two-tailed comparisons of the same frequencies were nonsignificant at the .10 level. This finding is interpreted to mean that the lower utility indexes for the total group of psychologists in Table 2 is not due to the fact that some psychologists were not affiliated with IJR. Hence, the results of the two groups of psychologists were pooled. It may be safely concluded that the results in Table 2 are due primarily to differences in the ways in which psychologists select and organize clinical information in contrast to psychiatrists or social workers.

A content analysis of utility indexes disclosed several interesting implications for the diagnostic process in cases of minimal intracranial pathology. It seems clear that the most consistent area of disagreement among the disciplines throughout the four cases is the apparent usefulness of items relevant to the possible role of parental factors or intrafamilial conflict in the etiology of the child's basic problem. Psychologists characteristically tended to disregard items relevant to these factors from the social history (Part I, Items 14-20) in favor of selecting parallel items from the psychiatric interview (Part VI, Items 52-58). Social workers, on the other hand, were apparently compelled to confirm or further investigate their clinical impressions from these items in the social history by selecting the parallel items in the psychiatric interview. Psychiatrists were similar to social workers in the use of these items but did not differ as consistently or as much with psychologists as did the social workers.

It is possible that psychiatrists may have attempted to corroborate their clinical impressions of these factors with the mother's original statement of the child's problems (Item I) as well as with items from the social history. These relationships can be seen by reference to the appropriate columns in Table 2.

A possible interpretation of the above findings is that items concerning parental factors and intrafamilial conflict were used by psychiatrists and social workers to confirm or substantiate clinical impressions, while psychologists used these items to supplement clinical impressions. In terms of the problem solving task structured for each subject in the present study, i.e., the diagnosis of the primary etiology of the child's problems (as opposed to questions of disposition), it seems plausible to assume that parental factors and intrafamilial conflict are probably of less clinical significance than developmental and medical data in ascertaining the importance of minimal organic pathology. Following this tentative assumption, it may be said that the psychologists were somewhat more economical in acquiring information and proceeded more critically than psychiatrists or social workers in all four cases. A preliminary appraisal of individual results revealed that the capacity of some psychologists to select items relevant to minimal intracranial pathology more discriminately seemed to be related to clinical insights gained from psychological test results.

Individual results in all three disciplines confirmed previous findings (Rimoldi, 1955; Rimoldi, 1960a; Tabor, 1959) that items with high utility indexes were often interspersed with items with low utility indexes. Items with high utility index values for a given discipline were selected at

different points in the diagnostic conceptualizations of the individuals within that discipline. Several subjects proceeded to exhaust the available information in one part of the test before going on to another, while the majority seemed to follow no consistent pattern in selecting items from the various subsections. In general, psychologists tended to complete their analysis of the psychological test data before going on with (or back to) the items on the display folder.

In effect, as a subject selected a given item in each case, he ranked the item in terms of its anticipated or expected usefulness in reaching a diagnosis. After diagnosing the patient, the subject was asked to re-arrange the items he had selected in terms of how much each item had actually contributed to his final diagnosis. This ranking procedure was designated RII. The rho coefficients between these two rankings (not tabled) were generally low. These rankings were largely retrospective and the low coefficients are not surprising in that judgments about the usefulness of information prior to solving a problem may not coincide with similar judgments after a solution has been reached. The rho coefficients are mentioned here to illustrate the differences between the perceived usefulness of an item in terms of its utility index (which reflects the relative frequency with which a particular group of subjects selects the item) and in terms of the individual subject, who appraises the item as useful in different ways before he selects it and after he selects, or has completed the task for which he selected it.

Utility Scores

Table 3 lists the means and standard deviations of the utility scores

for each discipline in each case.

Table 3

Means and Standard Deviations of Utility Scores

Discipline	Case A		Case B		Case C		Case D	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Psychiatrists	.71	.0575	.53	.0906	.57	.0621	.55	.0746
Psychologists	.61	.0855	.50	.0766	.54	.0718	.52	.0835
Social Workers	.64	.0518	.52	.0820	.56	.0663	.59	.0710

Each subject's utility score was obtained by averaging the utility indexes of all items selected by the subject. To eliminate a subject's contribution to his own utility score, these average values were corrected by Formula (9) (Rimoldi et al., 1958a, p. 31). The corrected utility score provides a measure of the subject's agreement with his own group as to the apparent usefulness of the available items in forming a diagnosis. Similarly, the mean utility score reflects the amount of agreement within a particular group of subjects in evaluating the usefulness of the items. It should be emphasized that utility scores as computed in the present study are estimates of the uniformity with which a specific discipline selects or disregards the available items of information in a specific clinical case and cannot be interpreted as a measure of the "correct" or of the most efficient way of acquiring, analysing, and synthesizing data to reach a diagnostic conclusion about the case in question. The latter involves comparisons with independent external criteria. Hence, while unlikely, if a group of subjects were, in

fact, consistently erroneous in their appraisal of the usefulness of the items in a particular clinical case, their mean utility score might remain quite high. In the Tests of Diagnostic Skill, Rimoldi and his associates have obviated this difficulty to a certain extent by the development of a criterion key (Haley, 1960; Rimoldi & Devane, 1960b) based on the performance of a group of medical experts (experienced physicians). Similarly, Tabor's results (1959) are based on the performance of a group of Rorschach experts who were relatively equated for level of training and experience.

These factors do not invalidate the utility scores obtained in the present study. On the contrary, subjects of varying levels of training and experience are more in keeping with the author's purpose to investigate interdiscipline (as opposed to intradiscipline) differences in the diagnostic process with cases of minimal intracranial pathology. Rather, the above qualifications serve to point out the limitations of the utility score in the present research as a measure of diagnostic competence.

Tables 13 and 14 (Appendix IV) give the results of further analysis of utility scores. Table 13 shows the evaluation of interdiscipline variance ratios by the F test and the results of t test comparisons of differences in mean utility scores. Table 14 presents the product moment correlations between utility scores and the number of cards selected. All of these correlation coefficients are highly significant ($p < .01$) and in the expected direction in view of the reported negative relationship between the number of cards selected and utility scores (Rimoldi et al., 1958a, pp. 32-33).

As in several other comparisons, Table 13 discloses that Case A most clearly differentiates the three disciplines in terms of mean utility scores.

Psychiatrists appear to be more in agreement among themselves than psychologists or social workers as evidenced by their higher mean utility scores. However, this interpretation should be made cautiously in view of the significantly higher number of cards selected by the psychiatrists in Case A (see Table 1). As Rimoldi et al. point out (1958a, p. 32), the utility score becomes less meaningful if subjects choose cards without differentiating between them.

If all subjects in a particular group select many cards, almost all utility scores will be high within that group. Since the utility score depends on the number of cards a subject selects and the number of cards the group to which he belongs selects, a high utility score does not necessarily imply that a subject proceeded through the problem solving task by selecting items discriminately if most of the other subjects within his group have equally high utility scores. In combination with the limited number of subjects in the present study, these factors may also account for the fact that the disciplines whose members selected the greater mean number of cards in each case (Table 1) have correspondingly higher rather than lower mean utility scores in each case (Table 3). Following the definition of utility scores, the more cards a discipline selects, on the average, the lower should be the mean utility score for that discipline <u>if</u> the subjects selected items with discrimination.

A further analysis of the significant interdiscipline differences in mean utility scores in Table 13 was made by the Median Test (Siegel, 1956, pp. 11-116). Interestingly, the significantly higher mean utility score for psychiatrists in comparison to the other two disciplines by the <u>t</u> test in

Case A did not reach significance when the data were analyzed by the Median Test, while the difference between the mean utility scores of social workers and psychologists in Case D remained highly significant ($p < .01$). The Median Test is generally not as precise a statistic as the *t* test, although its use is warranted in this instance in view of the limited *N* and the significant *F* ratios in Case A. The Median Test results tend to support other findings in the current study that psychologists seem to differ from both psychiatrists and social workers, but more significantly and consistently from social workers. Psychologists showed greater variability among themselves than social workers in the perceived usefulness of items in Case A and less agreement as a group in Case D.

Performance Curves

If the utility indexes of a particular group of subjects in a specific problem solving situation are ranked from highest to lowest and from lowest to highest, two curves may be plotted to represent maximum efficiency and minimum efficiency in acquiring information to solve the problem (Rimoldi et al., 1959b). These curves represent the overall performance of each group of subjects in each problem solving situation. The two curves are obtained by plotting the cumulative sum of the ranked utility indexes (Sum of Ui) against the rank order of the utility indexes (i.e., the number of items selected) from the highest to lowest for the maximum efficiency curve and from lowest to highest for the minimum efficiency curve.

In the present study, performance curves provide another measure of the amount of agreement on the apparent usefulness of the various items in each clinical case by each discipline. If the subjects in a given discipline

are in complete agreement on the usefulness of all items in a specific case, their performance curves will form a parallelogram. In this instance, all items would have a utility index of 1.00 or .00. These extremes would not be expected in actual performance curves since subjects obviously do not proceed through the diagnostic process by simply maximizing or minimizing utility indexes. However, the ratio between the area defined by maximum and minimum performance curves and the area defined by the parallelogram (maximum possible area or "perfect" item discrimination) may be taken as an estimate of the amount of agreement on the apparent usefulness of the items in each case by each discipline.

Figures 3 to 6 present the performance curves for all three disciplines on each case. Figures 7 to 9 give the performance curves for each discipline on all four cases. The maximum and minimum efficiency curves for each discipline have been specified for only one discipline on Fig. 3 and Fig. 7. These figures will be found on Pp. 59-65.

Table 4

Ratios of Obtained Areas to Maximum Possible Areas

Discipline	Case A	Case B	Case C	Case D
Psychiatrists	.486	.495	.509	.487
Psychologists	.504	.566	.540	.539
Social Workers	.509	.523	.498	.583

Table 4 lists the ratios between the obtained efficiency curves and perfect item discrimination in the present study. These values are quite similar

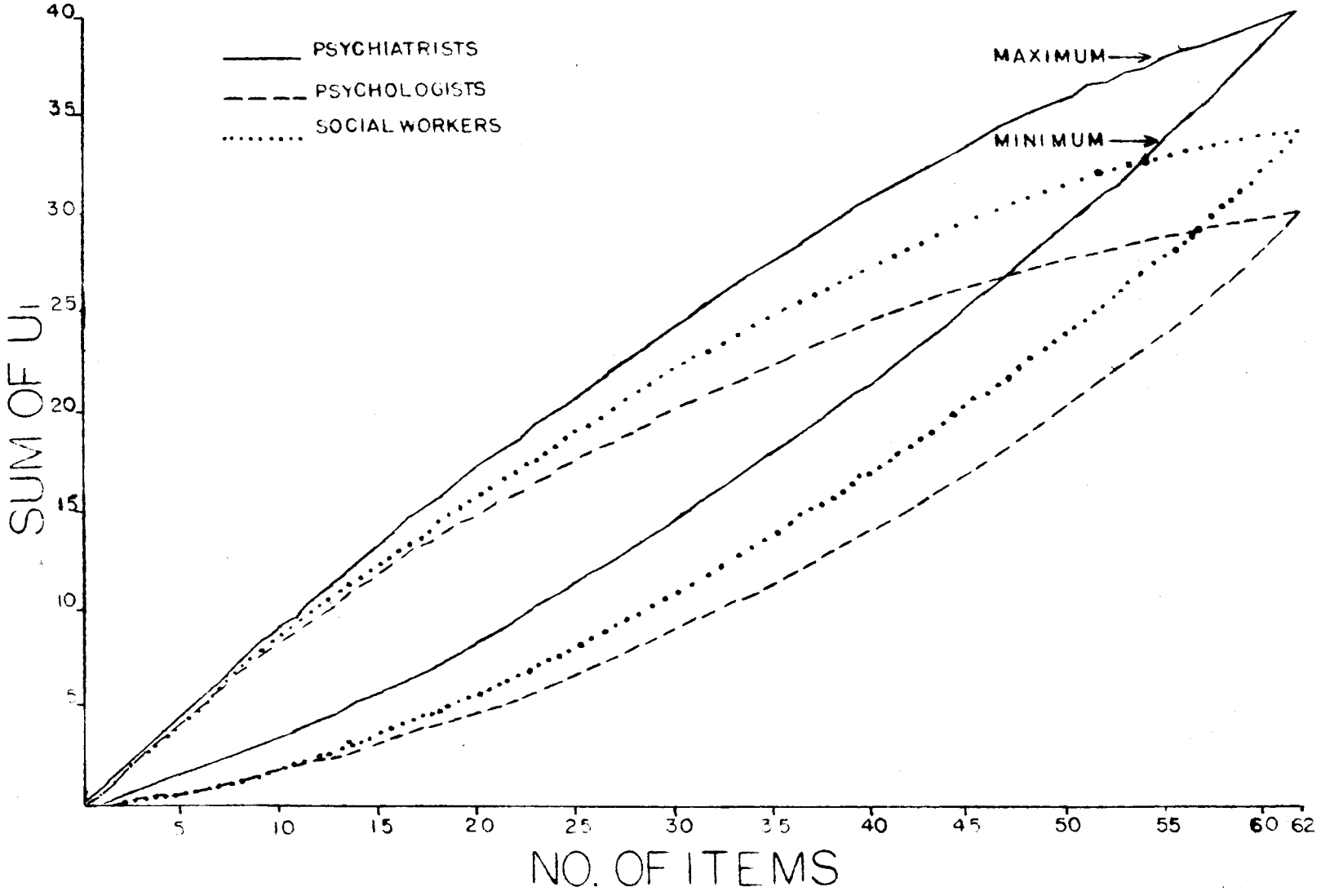

Fig. 3. Performance Curves on Case A for All Three Disciplines

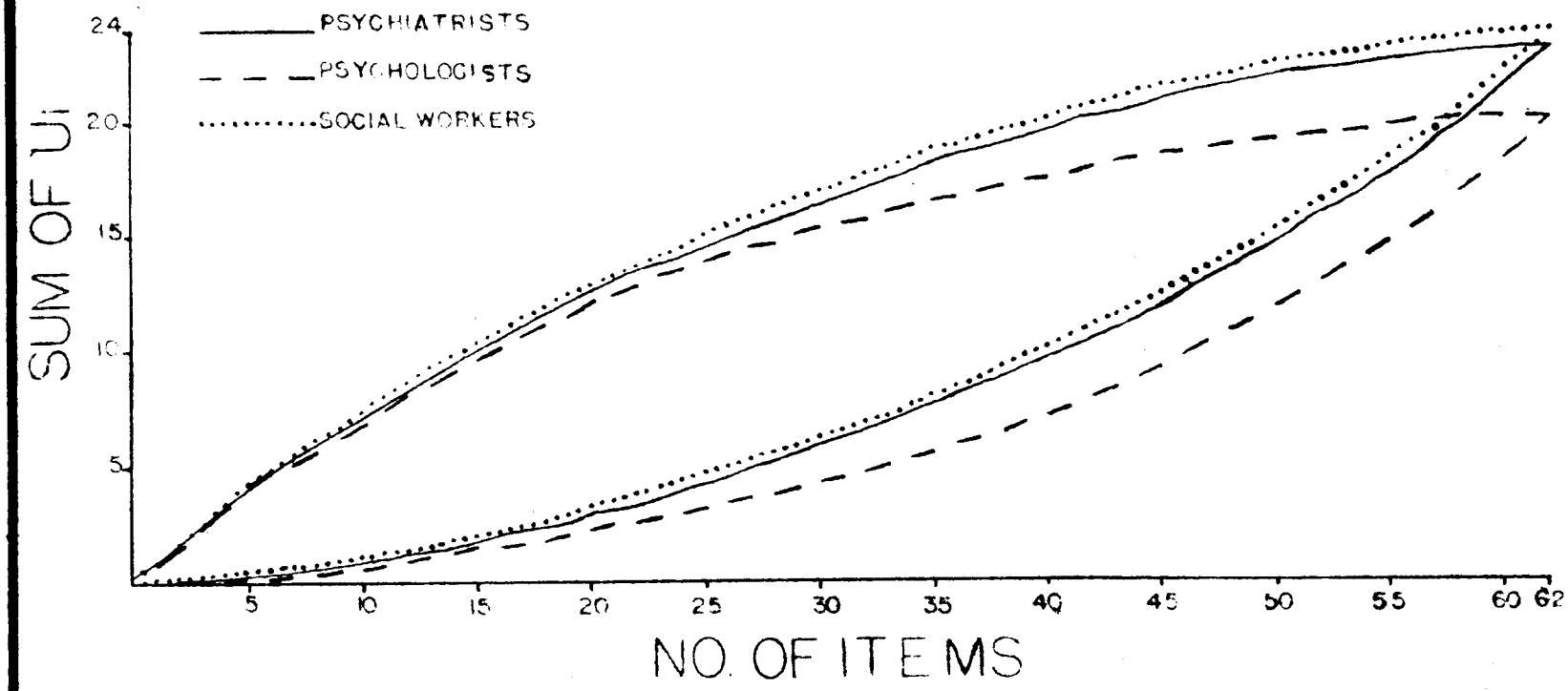

Fig. 4. Performance Curves on Case B for All Three Disciplines

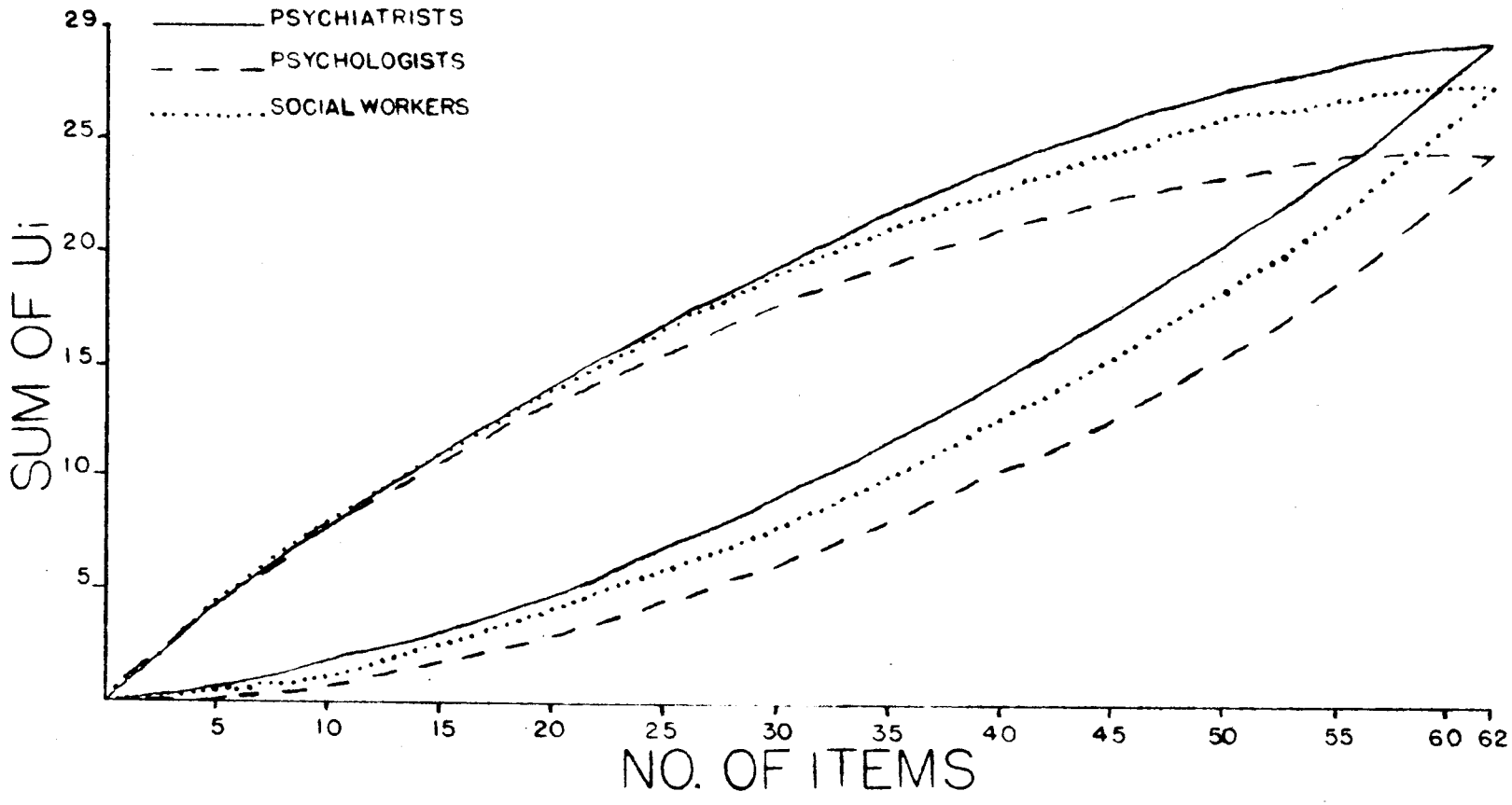

Fig. 5. Performance Curves on Case C for All Three Disciplines

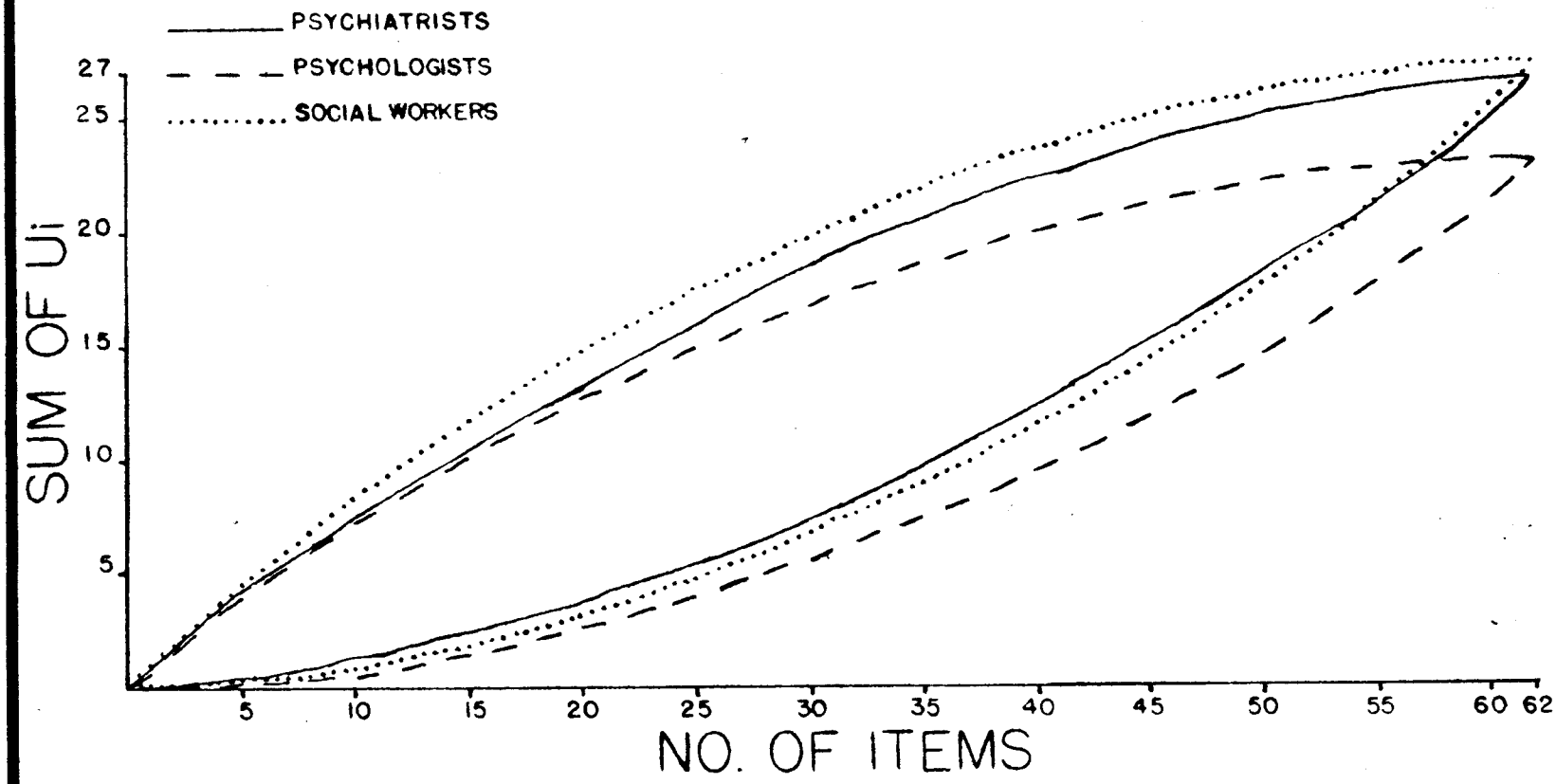

Fig. 6. Performance Curves on Case D for All Three Disciplines

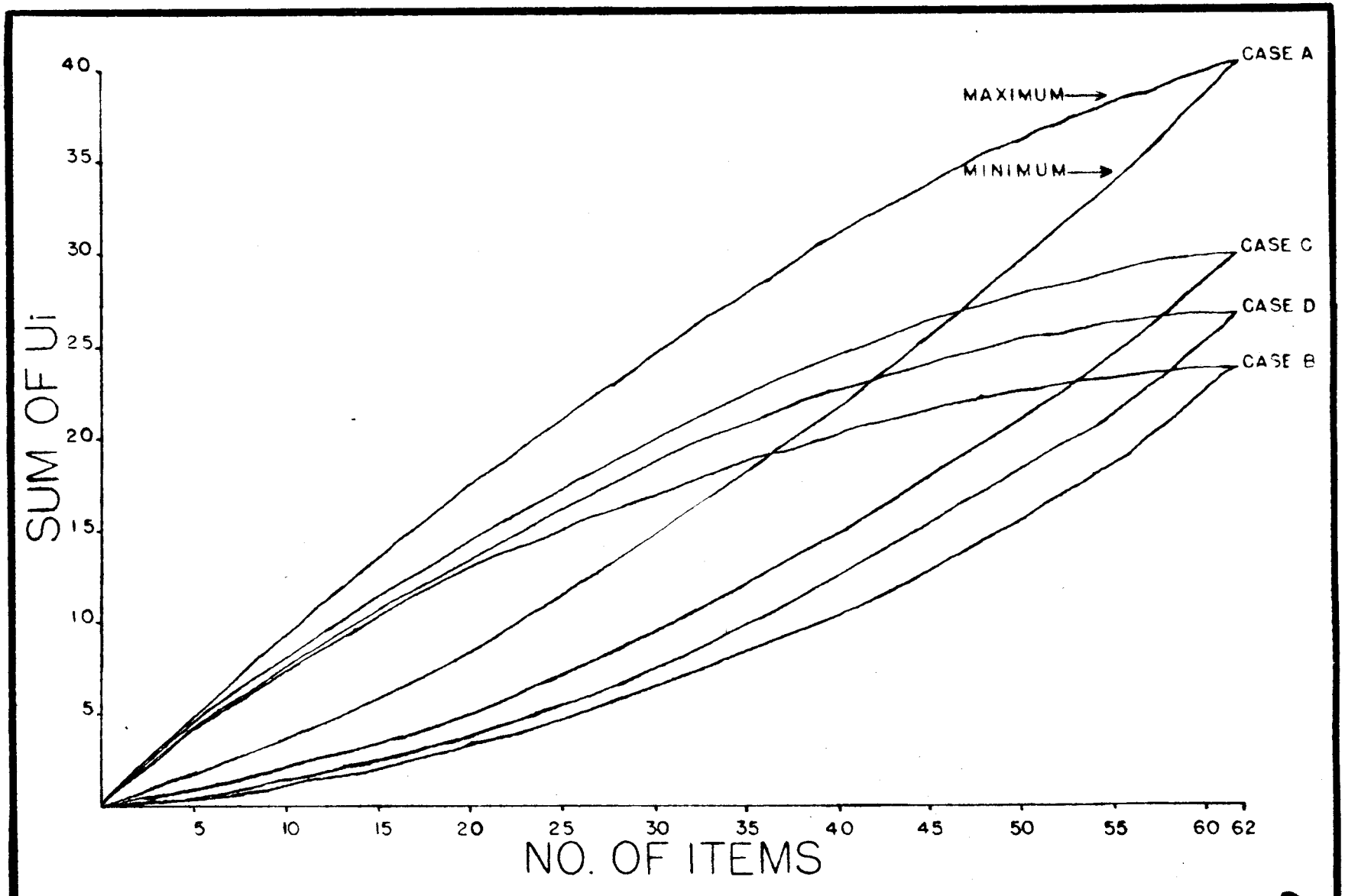

Fig. 7. Performance Curves for Psychiatrists on All Four Cases

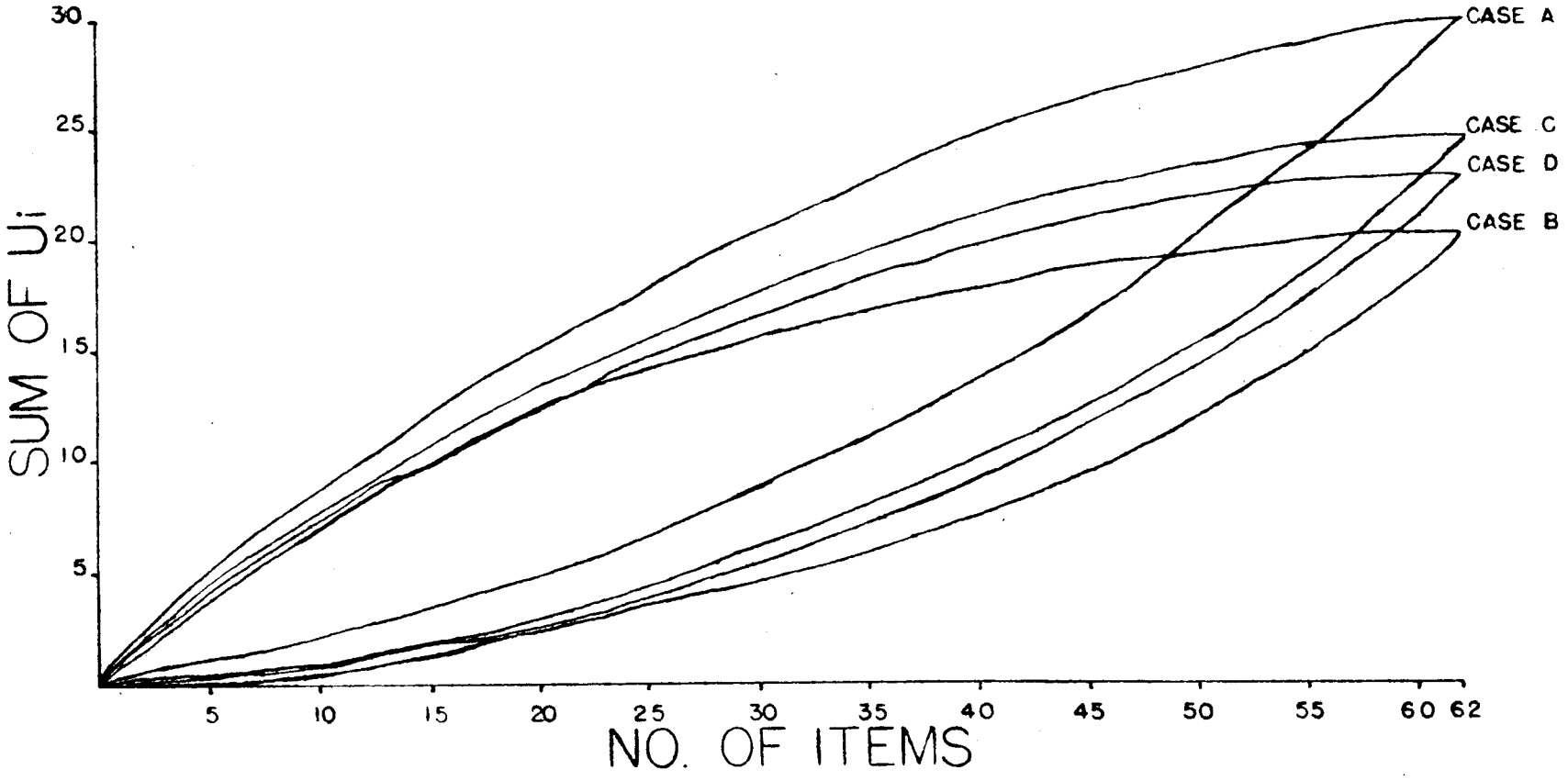

Fig. 8. Performance Curves for Psychologists on All Four Cases

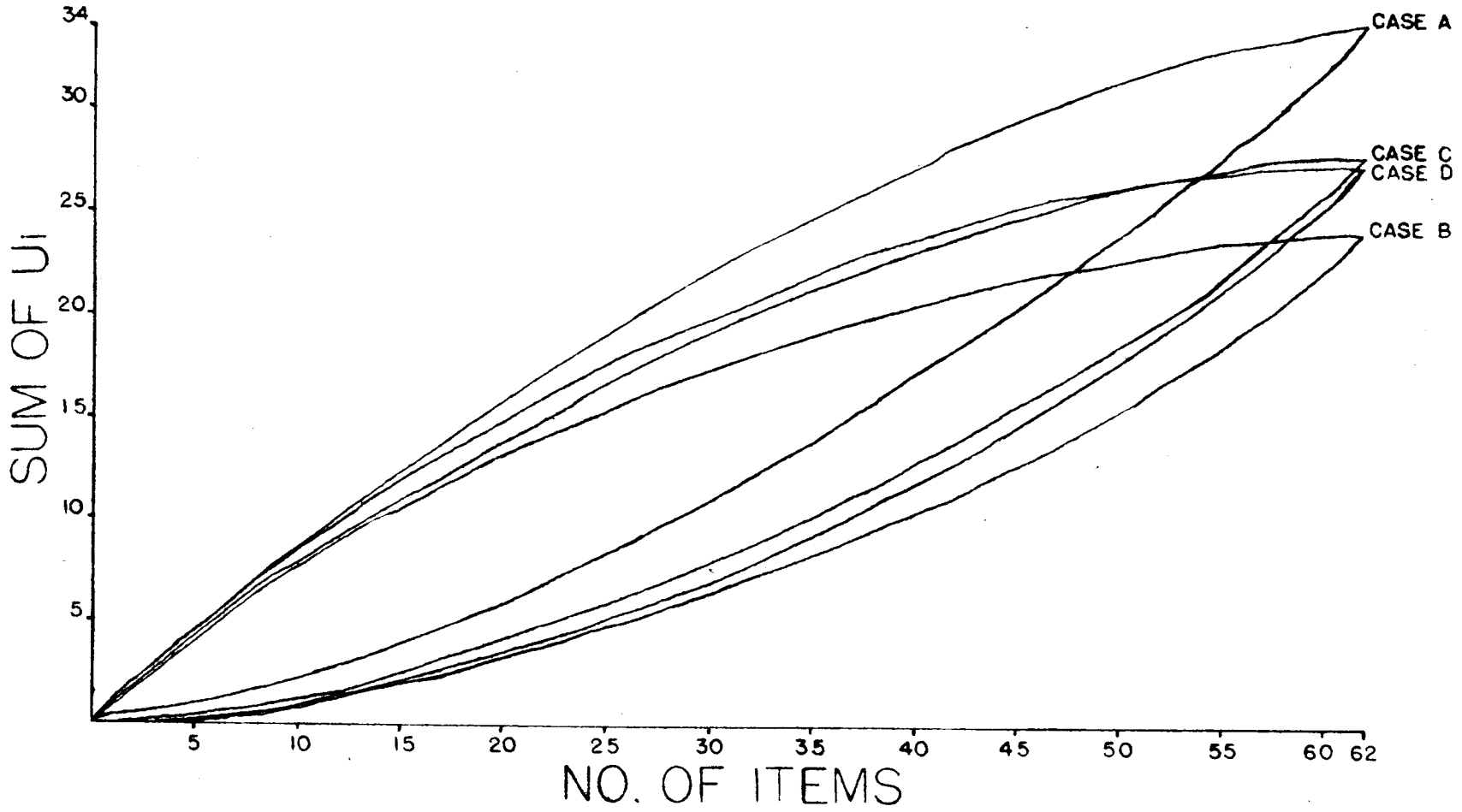

Fig. 9. Performance Curves for Social Workers on All Four Cases

to those reported by Tabor (cited in Rimoldi et al., 1959b, p. 11) and show a rather marked consistency between disciplines as well as between cases. The psychologists are somewhat more in agreement among themselves in Cases B and C while the social workers have slightly higher ratios in Cases A and D. No method has as yet been devised to evaluate differences in these ratio values for different tests or different groups of subjects. There do not appear to be any pronounced differences in the present data. However, it is clear from both Table 11 and inspection of Figures 3, 4, and 6 that the psychiatrists tend to be least in agreement among themselves on the usefulness of the items in each case except Case C. Stated another way, the psychiatrists seemed to show the least differentiation in selecting items in three of the four cases. As mentioned earlier, this tended to raise their mean utility score in such a way as to distort the latter as a measure of agreement on the amount of information needed to form a diagnosis (note especially the limited departure from linearity in the efficiency curves of the psychiatrists in Fig. 3 as contrasted to those of the psychologists and the social workers).

The lower ratio values for psychiatrists re-emphasize the limitations of the utility score in the present study. However, the results in Case A are actually rather consistent with what might be anticipated in the diagnostic approach of some psychiatrists to cases of suspected minor brain damage. It is conceivable that the psychiatrist's earlier medical training in organic pathology, coupled with subsequent exposure to nonorganic (i.e., functional or psychogenic) etiological viewpoints in his psychiatric training would call for an extensive and detailed analysis of all available data

to form a differential diagnosis in certain cases. It seems appropriate to point out that the majority of the more experienced psychiatrists expressed a felt need to thoroughly appraise some of the cases in view of their usual responsibility for the final diagnosis as the senior member of the clinical team. The effect of each subject's perceived role within the structure of the child guidance clinic was also reflected in statements by some psychologists and social workers protesting diagnosis as "the psychiatrist's job".

The degree to which the performance curve of an individual subject approaches the maximum efficiency curve defined by the group to which he belongs is determined by the utility indexes of the questions he asks, the order in which he asks these questions, and the total number of questions asked by the subject. Individual performance curves will be presented in the next chapter in the section on diagnostic conclusions to illustrate variations in the diagnostic approaches of different subjects who reach substantially the same conclusion about a given patient.

Pattern Analysis

It is possible to establish a model or "ideal" pattern of item selection based on the performance of a group of subjects. Rimoldi and Grib (1959a) describe a technique of pattern analysis in which items selected as well as items disregarded are considered in the determination of an index of agreement. This technique involves the subtraction of an observed pattern of item selection from a model pattern through a system of weights in such a way that the index of agreement will vary between 1.00 (when all subjects select and disregard items in a way specified by the model pattern) and 0.00 (in which instance all of the items specified by the model pattern have

been disregarded and the items selected represent a pattern that is the most deviant from the modal pattern). Since the performance of each subject within a group contributes to the establishment of a modal pattern for that group, the index of agreement provides a measure of the uniformity within the group taking into account those subjects who behave most dissimilarly from the expected or modal performance.

The foregoing analysis of results suggests that Case A should disclose a greater disparity in the indexes of agreement of the three disciplines than the other three cases. However, a pattern analysis of the items selected by each discipline in Case A yielded the following indexes of agreement: Psychiatrists = .779; Psychologists = .779; and Social Workers = .755. A supplementary pattern analysis of the items selected by psychologists in Case B resulted in an index of agreement of .776. Although a test of significance for the index of agreement is not as yet available, these values compare favorably with Tabor's (1959) results and indicate a very high degree of uniformity between the pattern of items each subject selects and what might be termed the ideal pattern for the group of subjects to which he belongs. Moreover, the extent to which individual subjects deviate from the ideal pattern for their own group is similar in each discipline. These results may be interpreted as a reflection of the homogeneity of each discipline in acquiring clinical information and of all three disciplines in the extent to which individual members deviate from their own group in Case A. In terms of specific items, however, the three disciplines differed markedly in their modal patterns. The ten most necessary items of information as specified by the modal pattern for each discipline in Case A

(determined by the rank order of utility indexes for these items obtained from Table 6, Appendix IV) were as follows: Psychiatrists--1, 3, 31, 38, 49, 23, 43, 46, 48, and 7; Psychologists--31, 25, 38, 29, 30, 40, 23, 43, 46, and 3; Social Workers--14, 16, 49, 15, 46, 3, 7, 8, 20, and 31. It is obvious that only three of these items (3, 31, and 46) were considered highly relevant by all three disciplines and that the disciplines did not concur on the relative importance of these three items. Thus, Item 31 (Evaluation of pathology indicated in the medical history) was selected by every psychologist, but only 16 social workers in Case A.

It would be extremely interesting to extend the present study and determine the index of agreement between each discipline's pattern of selections and a model pattern derived from an interdiscipline discussion of the relative importance of various kinds of clinical data in cases of suspected central nervous system pathology. This would permit an appraisal of the uniformity of diagnostic thinking within as well as between the disciplines that comprise the clinical team. Evidence in the preceding paragraph indicates that each discipline's pattern of item selection would be less in agreement with this combined model than with its own model. In summary, the highly similar indexes of agreement obtained by pattern analysis in the present study should not be interpreted to mean that the disciplines did not differ in their appraisal of the various items in Case A. Rather, the disciplines show a rather remarkable consistency in the way in which each subject conforms to a pattern of item selection specified by the group to which he belongs.

CHAPTER V

DISCUSSION

Diagnostic Conclusions

Each subject was asked to state his diagnostic conclusion in terms of the categories listed in the APA Diagnostic Manual (1952, pp. 78-86).

> The Standard Nomenclature List is divided into eight broad classes of mental disorders. These classes and their respective code numbers are as follows: 01-09 Acute Brain Disorders; 10-19 Chronic Brain Disorders; 20-24 Psychotic Disorders; 30-39 Psychophysiologic Autonomic and Visceral Disorders; 40 Psychoneurotic Disorders; 50-53 Personality Disorders; 54 Transient Situational Personality Disorders; and 60-62 Mental Deficiencies. The second digit represents the major diagnostic categories within these broad classifications. The third digit of the four digit code follows a period and denotes the specific subdivisions within each major diagnostic category. The fourth digit is zero or indicates a qualifying phrase as follows: .01 With psychotic reaction; .02 With neurotic reaction; or .03 With behavioral reaction.

This procedure was employed to provide a framework within which each subject could synthesize his clinical inferences to form a diagnosis. However, as noted earlier, the Manual is somewhat limited in applicability to the diagnostic problems encountered in a child guidance clinic. Several subjects were rather critical of its use in the present study and disparaged it as something used "only by hospital statisticians". Contrary to Tabor's expectations (1959), many subjects expressed a preference to "talk out" their clinical impressions about each patient rather than attempt to fit the children into diagnostic categories. On the other hand, the more

articulate members of each discipline seemed to be stimulated by the challenge to their clinical acuity involved in the accumulation of sufficient information to warrant a specific diagnostic conclusion. Moreover, the use of this procedure permits a fairly accurate appraisal of the extent to which each subject and each discipline considered organic factors of primary importance in the four cases.

That is, on an inferential level, if a given subject acquired evidence in a way which subjectively convinced him that chronic organic pathology was of primary importance, he would diagnose the patient as a chronic brain disorder. From this point of view, no assumption need be made about the validity of the original or obtained diagnostic categories. The fact that all four cases were originally diagnosed as chronic brain disorders following a staff conference attended by the three experienced members of these disciplines (i.e., the twelve original examiners) who had actually clinically evaluated these four children cannot be disregarded. However the present study is not directed toward discovering whether the original staff moderators and examiners were "correct" in their diagnostic conclusions, but whether other experienced members of the same three disciplines form similar diagnostic conclusions about the same four patients. For this reason, no assumption need be made about the validity of some diagnosis other than chronic brain disorder for any of the four patients. In this instance, it may only be inferred that organic factors were not of primary importance in the subject's terminal diagnostic thinking.

The above distinctions should be clearly understood in the following discussion. There is no question that determining or deciding the primacy

of organic factors requires highly specific clinical judgments. In this context, there is evidence to show that several subjects in the present study delineated the role of organic factors more comprehensively and with greater precision than the members of their own discipline at the original diagnostic staff conferences on these four patients. Certain precautions were taken by the author to insure that a given subject actually considered a chronic brain disorder diagnosis the best way to summarize and characterize the child's major problem. Before discussing the results of these procedures, reference is made to Table 15, Appendix V, which lists the original staff psychiatric diagnoses for each patient and those given by each subject in the present study. The cell entries in Table 15 are APA code numbers.

The original staff diagnosis of each case is given directly below the case heading. The underlined code numbers indicate that the structured inquiry outlined in the procedure section was employed to clarify the subject's evaluation of organic factors. In these instances, the subject either mentioned the "possibility" of organic brain damage in his summary statement about the case, or stated that he was unable to assess the degree to which organic factors were involved in the child's primary problem but that he felt they might contribute. If the letter a follows a subject's diagnosis, the subject either spontaneously, or as a result of the structured inquiry, added a statement that organic factors were secondary to the primary diagnosis but definitely contributed to it. If no letter follows an underlined diagnosis, the subject finally decided that organic factors were of little or no importance. A similar interpretation should be given to the b referent for emotional factors and to the c referent for other forms

of pathology.

The primary diagnosis as determined in the current investigation and described above may be viewed as an estimate of the relative importance of organic factors in each subject's diagnostic conclusions. In addition to a theoretical orientation, the personality characteristics of the subjects, their subjective certainty in each case, a possible tendency to satisfy the experimentor, and other nonintellective factors are probably also involved in these diagnostic conclusions, especially in view of the relative complexity inherent in cases of minimal intracranial pathology. It seems probable, however, that these nonintellective factors would also operate if less complex clinical cases were employed, whereas the relative diagnostic complexity of each case in the present study could be related to each discipline's assessment of organic factors in that case. That is, by training and orientation, interdiscipline differences could be expected in cases in which the organic pathology is more obscure on the one hand, or offset by marked emotional or other forms of pathology on the other. To investigate this relationship, the number of subjects diagnosing each patient as a Chronic Brain Disorder (APA codes 10-19 in Table 15) was used as a measure of the relative importance of organic factors. The median rank assigned to each case in terms of its diagnostic complexity in comparison with the other three cases (XIII) was used as a measure of the comparative difficulty of the four cases. The results are shown in Table 5, p. 74.

The last two rows in Table 5 show the total number of subjects within each discipline who considered organic factors of primary or secondary importance in each case.

Table 5

Relative Importance of Organic Factors in Cases Differing in Diagnostic Complexity

(Cases ranked in RIII from "most complex" = 1 to "least complex" = 4)

Measure	Case A			Case B			Case C			Case D		
	PI	PO	SW	PI	PO	SW	PI	PO	SW	PI	PO	SW
Median Complexity Rank	1	2	2	3.5	3	3	2	2	2.5	3	3	3
No. of Chronic Brain Disorder Diagnoses	14	10	3	3	10	5	1	7	3	6	11	2
No. Considering Organic Factors Secondary	3	6	3	5	2	5	2	3	1	8	3	5

It is interesting to note the consistency in the median complexity ranks within each case in spite of the variety of diagnostic conclusions. Also, note the similarity between these rank orders and the end points of each discipline's performance curves on all four cases (Figs. 7, 8, and 9). The rank order of these end points suggest that each discipline required a greater amount of clinical information to form a diagnosis in the same cases which they later ranked in order of complexity.

Several limitations of the complexity ranking as an objective measure of the difficulty of each case should be noted. Firstly, most subjects reported some difficulty in comparing Case A to the other cases since the clinical aspects of Case A seemed to be confounded to a certain extent by their attempts to understand and complete the task confronting them.

Secondly, it is obvious that the complexity due to the underlying organic pathology in each case is reflected in these rankings only to the extent that organic factors became a source of confusion in each subject's final diagnosis. Finally, some subjects tended to equate the complexity of a case with the presence or absence of conflicting evidence. Of course, the meaning of what constitutes conflicting evidence may vary between subjects as well as disciplines, and the amount of conflicting evidence is highly dependent on the specific items each subject selects (or disregards).

Despite these limitations, it seems clear that all three disciplines tended to regard Cases A and C as more difficult than Cases B and D. The psychiatrists tended to place somewhat more emphasis on the organic factors in Case A than psychologists and considerably more than social workers, although, as noted earlier, this seemed to be a result of an exaggerated comprehensiveness rather than the discriminate selection of items relevant to the organic factors in this case. Disregarding Case A, Case C appeared to present the greatest diagnostic challenge to each discipline. Considering the number of both primary and secondary organic diagnoses, all three disciplines also tended to place greater emphasis on emotional or other factors than on organic factors in Case C, corroborating the assumption that the clinical team may be somewhat more inclined to overlook organic factors when such factors are obscure or when alternative diagnoses will suffice.

Following this assumption, it is worthwhile to compare each discipline's performance in Cases B and D since these two cases are the most markedly dissimilar in symptom formation. There is evidence to show that the patient in Case B is the most overtly as well as the most seriously disabled in all

areas of mental and emotional development. The patient in Case B, on the other hand, evidences the best overt adjustment in spite of greater emotional stress within the family and the fact that the neurological sequelae consequent to organic brain injury are the most pronounced in this case. In Case B, each discipline's performance reflects the continuing controversy in psychiatric literature (Benda, 1952; Bender, 1956; Kanner & Eisenberg, 1955) as to whether the fundamental etiology underlying the behavior of autistic children is psychogenic or due to some form of developmental or maturational dysrythmia. In terms of thought processes, the psychiatrists tended to follow a line of reasoning leading to a psychogenic diagnosis in Case B, while the psychologists seemed to be more impressed by the organic substructure. Quite contrary to expectations, social workers appeared to give greater weight to the organic factors in Case B than in any other case. Reference to Table 12 (Appendix XII) reveals that psychiatrists developed a clinical picture of this patient by accumulating behavioral descriptions (note the higher utility indexes for Items 1, 38, 43, and 49) at the expense of a more detailed analysis of the medical history (note especially the significantly lower utility index for psychiatrists in Item 31 in contrast to psychologists. This item listed EEG findings and the results of a neurological examination). In terms of theoretical orientation, and in view of the well known overlap in symptom formation between certain types of organic brain disorders and childhood schizophrenia, it is interesting to note that the psychiatrists fall into two distinct camps (a possible third is indicated for those who considered organic factors secondary) in Case B (See Table 15, Appendix V). It is possible that the dominance of psychogenic diagnoses is

at least partially related to the abovementioned shifts in etiological thinking that frequently accompany psychiatric training and experience. Almost all of the psychiatrists who diagnosed this patient as a childhood schizophenic (22.70) seemed unable to look beyond the bizarre symptoms this child manifested for possible organic pathology.

In Case B, each subject's line of diagnostic reasoning was even more explicitly related to the specific sequence of items selected. Psychiatrists were not as convinced of the importance of organic pathology as psychologists, but were more compelled to include organic factors as secondary than in any other case. Social workers, on the other hand, seemed to proceed with the least awareness of organic factors by limiting their evaluation to items which emphasized the roles of intrafamilial conflict and parental problems in the patient's maladaptive behavior. The performance of social workers in Case B and in Case A seems to represent the "functional" orientation discussed in the review of literature (Hamilton, 1947, p. 22; Hamilton, 1951, p. 220).

It may be concluded from Table 5 that psychologists as a group considered organic factors of greater significance than did psychiatrists or social workers irrespective of the particular way in which organic pathology was evidenced in each case. While psychiatrists placed greater emphasis on the organic factors in Case A, their performance on the other three cases, suggests this to be a function of their specific diagnostic approach to Case A. Two factors relevant to the professional training and theoretical orientation of psychologists seem plausible in accounting for their greater sensitivity to the organic pathology throughout the four cases. As shown

in the section on utility indexes in the preceding chapter, the psychologists tended to proceed with greater economy and less repetition of supplementary evidence in reaching a diagnosis on all four cases. Combining this fact with the results in Table 5, it would seem that psychologists had a somewhat greater capacity to discern the significance of organic pathology than the other two disciplines. Since any problem solving activity involves, at one stage or another, the explicit application of implicit hypotheses about the solution, it may be postulated that this economy in diagnostic thinking is at least partially related to the emphasis on clearly-defined hypothesis testing in the professional training of clinical psychologists. The second factor is more empirical, and is based on the conclusions of some previous authors (Bradley, 1955; Group for the Advancement of Psychiatry, Committee on Child Psychiatry, p. 336; Masland et al., 1958) that the experienced child psychologist is frequently better able to assess the degree (as opposed to demonstrating the cause) of behavioral impairment consequent to minimal organic pathology than the other members of the child guidance team through the clinical insights he can gain by a qualitative appraisal of an appropriate battery of psychological tests. In the present study, a qualitative appraisal is defined as the actual examination of any or all of the original test data rather than mere knowledge of quantitative results gained by selecting Item 46 (Intelligence quotients and test scores). Both types of evidence, of course, were available to all subjects.

Individual Performance Curves

Most of the results discussed thus far might be said to coincide, in general terms, with what is known of the clinical diagnostic approach of

each discipline. However, there are limitations inherent in the present sample of cases and subjects, and in the fact that the research technique employed has not been used in similar problem solving situations in which the "correct" solution is itself an unknown.

These limitations call for a more detailed appraisal of the mental processes followed by individual subjects within the context of the "normative" behavior defined by their own group. More explicitly: do the subjects within each discipline who diagnose a given patient as a chronic brain disorder differ in their mental approach from the mental approach which characterizes their own or that of other disciplines, and in what ways? Or, since there is considerable consistency of agreement within each discipline on the usefulness of the various items on a given case, how inconsistent are those subjects who diagnose the patient as a chronic brain disorder from those who do not?

The complex implications of these two questions for each case may be multiplied by four. For reasons shown in the sections on utility scores, pattern analysis, and elsewhere, the questions seem particularly relevant to subjects with extreme utility scores in Case A. Figure 10 shows the individual performance curves of two subjects in each discipline who achieved the highest and lowest utility scores and who were also among those subjects who diagnosed Case A as a chronic brain disorder. Figure 10 is on p. 80.

Note that there are three sets of three curves each in Fig. 10. For comparative purposes, the empirically derived "maximum" efficiency curves for each discipline in Case A (from Fig. 3) have been reproduced in the upper (A) curves of each set in Fig. 10. The middle (B) curves and the

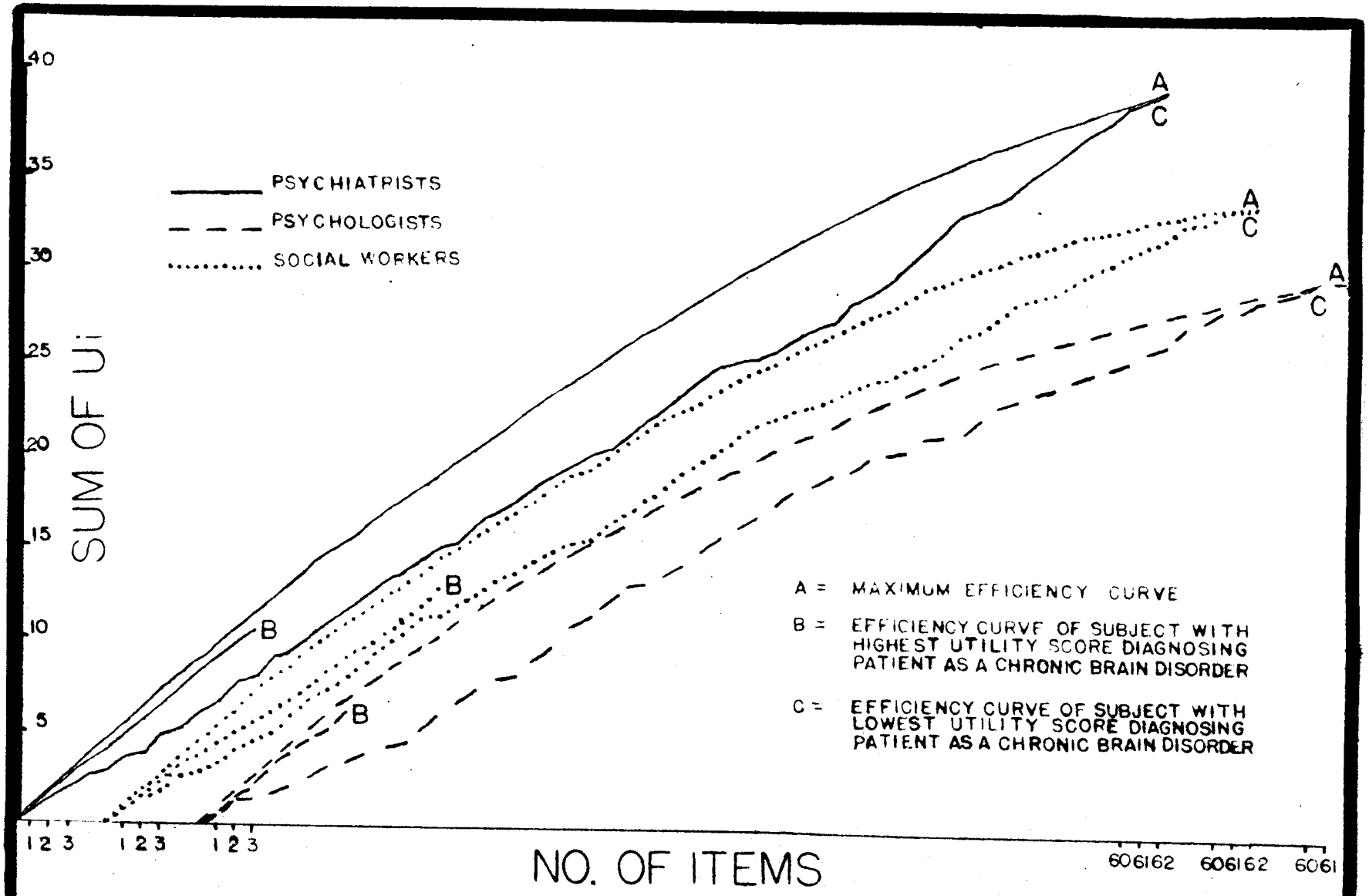

Fig. 10. Individual Efficiency Curves for Six Subjects with Extreme Utility Scores Within Their Own Discipline Who Diagnosed the Patient in Case A as a Chronic Brain Disorder

lower (C) curves show, respectively, the cumulative utility index plots of the subjects with the highest and lowest utility scores within each discipline who, at the same time, were among those subjects who diagnosed the patient in Case A as a chronic brain disorder. The B and C curves represent the performance of these six subjects in Case A. Note that the sum of the cumulative utility indexes (height of each B and C curve) may be compared directly for the six subjects, but the number of items can be compared only indirectly since the baseline differs for each discipline.

The author's purpose in selecting subjects with extreme utility scores in Case A was to determine if differences in their diagnostic approach would be reflected in their individual performance curves. It was assumed that the two subjects with extreme utility scores would differ markedly in the number of items selected in view of the high negative correlation between utility scores and number of items selected (see Table 14, Appendix IV). However, no assumptions were made concerning the relationships between these factors and which subjects actually diagnosed the patient in Case A as a chronic brain disorder. From Table 5, it may be seen that 14 psychiatrists, 10 psychologists, and 3 social workers diagnosed this patient as a chronic brain disorder. It is noteworthy that subjects with the highest and lowest utility scores within each discipline actually did diagnose this patient as a chronic brain disorder. Further, the subject who selected the most or second most cards and the subject who selected the least or second least number of cards within each discipline reached the same diagnostic conclusion about <u>this</u> patient, i.e., that the patient was brain damaged and that organic factors were of primary importance. It is important to point out

that subjects with the highest and lowest utility scores in the other three cases did not evidence a similar consistency in diagnostic conclusions.

A second unexpected finding was that the B Psychologist diagnosed this patient as a chronic brain disorder without the use of psychological test data. While this is by no means a single example of such an omission, as will be shown in the next section, its importance in the present discussion should be kept in mind.

To date, no strict method of comparing individual performance curves has been devised.[5] It seems plausible, however, that the height of each B and C curve in Fig. 10 may be taken as a measure of the total amount of clinical information the subject required to diagnose the patient as a chronic brain disorder. The slope of each curve appears to represent the way in which a subject proceeded to reach this diagnostic conclusion. In the present context, the slope could be considered a measure of each subject's effectiveness in acquiring necessary and sufficient information to diagnose the patient as a chronic brain disorder at each successive step in the diagnostic process. It is clear, of course, that the height and slope of a curve are interrelated. It is also evident that the same functions could be used to describe performance curves of subjects with different diagnostic conclusions. The interpretations of the curves in Fig. 10 are assumed to hold only for Case A.

In comparing the B curves, it may be said that the Psychologist

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[5] In a recent personal communication, Dr. Rimoldi informed the author that a mathematical procedure by which individual performance curves may be compared has been found. This procedure will be published in the near future.

proceeded with greater economy and required less clinical information to diagnose the patient as a chronic brain disorder than the Psychiatrist or the Social Worker. It will be recalled that definitive evidence of minimal organic pathology in Case A was shown by the EEG results (in Item 31) and by qualitative psychological test data (see the discussion on selection of clinical cases). But since this Psychologist did not use psychological test data in forming this diagnosis, his competence in the appraisal of psychological test data cannot account for his economy in discerning the importance of organic factors in this case. The Psychologist acquired necessary and sufficient evidence to diagnose the patient as a chronic brain disorder by selecting certain items from the display folder, as did the Psychiatrist and the Social Worker. Why did he require less evidence than the other two? An interesting answer is found in a comparison of the point in their sequence of item selections at which these three subjects selected Item 31 in relation to the total number of items selected by each subject. The relevant coordinates for the Psychologist are fourth in a sequence of eight; for the Psychiatrist, third in a sequence of thirteen; and for the Social Worker, twelfth in a sequence of eighteen. It is obvious that no one item is selected in isolation and that no item can be considered independent of the items that precede or follow it. Nonetheless, it may be inferred from these coordinates that the Psychologist became aware of the organic pathology at an early point in the diagnostic process and that, once he was aware of the organic pathology, he required less additional evidence to diagnose the patient as a chronic brain disorder than the Psychiatrist or Social Worker.

It may also be stated that the B Psychologist reached this diagnosis by a critical assessment of the specific items which the majority of psychologists (again, leaving aside the number who used test data) considered necessary to evaluate the patient in this case. This is shown by the contiguity of the Psychologist's performance curve to the maximum efficiency curve for psychologists. The Psychiatrist demonstrated a similar acuity of judgment in discerning the organic factors from the items considered necessary by the majority of psychiatrists, but he required more of such items than the Psychologist. The latter finding supports the earlier evidence that some differences between disciplines in Case A are obscured by the greater number of items selected by psychiatrists. The B Social Worker, on the other hand, clearly required the most items to clarify and subjectively establish the primacy of organic factors in this case. Further, her performance curve is actually more contiguous to the C Social Worker's than to the maximum efficiency curve for Social Workers. This is an extremely interesting illustration of the way in which these two Social Workers (together with the third giving a similar diagnosis) differed from all other social workers by selecting the items in a sequence which emphasized the organic rather than the emotional factors in Case A.

The C curves are more difficult to interpret since these subjects exhausted all available items before reaching any diagnosis (the C Psychologist's curve is one unit shorter since no psychologist selected Item 2 in Case A). It may be said that all three subjects required the maximum amount of information to evaluate the organic factors. Thus, the point at which the organic factors became crucial in their diagnostic thinking is less

apparent. Although the C Psychologist examined the patient's WISC and Rorschach, she did so only after determining "who was the examining psychologist." She later said that she had placed almost as much weight on this factor as on the actual test evidence in forming her diagnosis. Item 31 was selected 16 items earlier, and was interspersed with a number of other items which she also later claimed had no influence on her examination of the test data. Similar ambiguities were observed in the thought sequence of the C Psychiatrist and Social Worker. It should be noted, however, that the C Psychologist and Social Worker did not deviate as markedly from their maximum efficiency curves as the C Psychiatrist. The C Psychiatrist's performance curve approximates linearity, providing further evidence of the distorted effect of the large number of items on the utility scores of psychiatrists as well as the relative lack of item differentiation by psychiatrists in Case A.

It should be clearly understood that the results in Fig. 10 can only be said to apply in Case A despite their consistency with parallel findings in the other cases. It is very interesting to note how they tend to support the latter. In keeping with the primary purpose of the current study, these findings are presented to illustrate ways in which the analysis of the height and slope of individual performance curves and their contiguity with other curves may contribute to an understanding of the mental processes involved in diagnosing a certain kind of clinical case, specifically those involving minimal organic pathology. This feature appears to be one of the more promising contributions of the test of diagnostic skill to this clinical problem.

Spontaneous Comments

The spontaneous comments of most subjects throughout the tasks provided additional evidence in support of the results of the present study. Since verbalizations were neither required nor discouraged, they seemed to be all the more meaningful in relation to the point at which they emerged in the subject's thinking. The fact that they were not required prooably reduced their frequency considerably. However, two noteworthy general trends may be discussed.

In the first trend, the basic interdependence of the clinical team in cases of minimal intracranial pathology was evidenced. In routine clinical procedures, social workers are generally responsible for obtaining information about the prenatal and development history of the patient, psychologists obtain information about the patient's mental and emotional functioning through psychological tests, and psychiatrists are responsible for investigating and ordering further examinations to clarify any medical problems the patient presents. It is noteworthy that psychologists and social workers lamented their lack of knowledge about the EEG, psychiatrists and social workers commented that an evaluation of psychological tests would be of considerable help, and psychiatrists and psychologists wanted to know more about prenatal and postnatal development. Such remarks are not unusual in themselves, of course. However, it is significant that these comments characteristically emerged when a psychiatrist, psychologist, or social worker had a residual doubt about the possible importance of underlying organic pathology. If a subject protested his inability to evaluate organic factors or verbalized a need for an interpretation of evidence routinely obtained by another

discipline, the author asked the subject to try to resolve such doubts within the framework of the knowledge of his own discipline. It is important to distinguish these instances from those in which the structured inquiry was employed. The latter was employed only if such comments accompanied a subject's summary diagnostic statement. Comments of insufficient knowledge of a certain kind of evidence, on the other hand, seemed to occur as soon as the subject became aware that he might need that particular knowledge (e.g., after selecting Item 31) to "rule out the organicity".

In terms of the results obtained in the present study, the line of reasoning suggested by the author placed the subject in a position of evaluating the relative importance of organic factors by recourse to his own professional training, clinical experience, and personal orientation.

The second general trend might be said to represent each discipline's verbalized awareness of the fact that they were deriving clinical insights about a patient they had not actually seen. In distinction to a request for a qualitative appraisal by the original examiner, however, these comments usually preceded some question about the examiner's level of training and experience. These comments tended to emerge when the subject was most puzzled by some apparent omission by the original examiner. As might be expected, such comments and questions were almost always about an examiner from the subject's own discipline. Interestingly enough, the only other question from the total domain of available information about each examiner was whether the examiner was a male or a female. Finally, it should be noted that relatively more psychologists asked questions about the original examiners than psychiatrists or social workers.

Employment of Psychological Tests in Forming a Diagnosis

In the first section of this chapter, three untested postulates were made concerning the possible effects of professional training on the diagnostic approach of each discipline in cases of minimal intracranial pathology. Briefly, these may be recapitulated as a possible shift from organic to nonorganic modes of etiological thinking accompanying the psychiatrist's training, the emphasis placed on explicit hypothesis testing in the training of the psychologist, and a possible "functional" rather than diagnostic orientation in the training of the social worker. Since the present study is basically exploratory, no attempt has been made to validate these assumptions, nor have they been stated in more specific terms since hypotheses as such should be considered possible outcomes rather than necessary antecedents in mapping-out experiments.

Whatever the validity of these assumptions may be for a given subject on each case, all of the results discussed thus far and especially in this chapter indicate that psychologists as a group were consistently more economical in acquiring necessary and sufficient information to warrant a diagnosis and were equally consistent in attributing greater weight to the organic factors in each case than the other two disciplines. Due to their unique competence in evaluating psychological test evidence, it becomes rather important (as noted in the beginning of the preceding chapter) to determine the contributive role of test evidence in the diagnostic thinking of individual psychologists. Obviously, any relationship that might exist between a psychologist's competence in formulating and testing hypotheses as a result of professional training and the economy with which he discerns the

organic factors in the present study can be inferred only indirectly from the way in which he employs psychological test evidence.

The author's approach in investigating the possible relationships between these two factors involves several limitations which should be clarified. It is assumed that a clinical psychologist is the only member of the child guidance team who is professionally qualified by training and experience to evaluate test evidence in the sense of judging whether or not organic pathology is suggested or confirmed by the test evidence. Hence, while it might be interesting to speculate on the ways in which the six psychiatrists who inspected the psychological test data in one or more cases employed this evidence in forming a diagnosis, their results are not further discussed here. It may be added parenthetically that no social worker requested to inspect the test data in any of the four cases.

A second limitation follows from the fact that the employment of psychological test data in forming a diagnosis of chronic brain disorder may be described in terms of the tests themselves (i.e., which tests were originally given the patient, which of these were actually used, and in what sequence, by the psychologists in the present study, which of these psychologists considered the organic factors of primary importance in each case, etc.) or in terms of the evidence derived from tests as one type of clinical information in comparison with evidence derived from items on the display folders. Since there is no empirical justification for the assumption that any one psychological test or combination of "signs" or "patterns" from a group of tests reliably discriminates the minimally brain damaged child from the cortically-intact child (Goldenberg, 1955, P. 164; Sarason, 1949, p. 57), it would seem

more appropriate to limit the present discussion to a qualitative description of the quantitative relationships that exist between psychologists who derived clinical inferences for or against the primacy of organic factors with some degree of consistency.

A final limitation inherent in the discussion of how psychologists employed psychological tests in forming a diagnosis is the fact that only four clinical cases were used in the present study. If these or other clinical cases of minimally brain damaged children were presented to the 20 psychologists under different circumstances, other results might have been found. The latter is also true for the 20 psychiatrists and the 20 social workers. However, because the psychologists evidenced considerable consistency among themselves and consistent differences from the other two disciplines, the discussion in this section may lead to other applications of the technique employed in this study in future experimental work on similar problem solving situations.

It is unfortunate that the design of the present study did not provide the same type of statistical data for specific psychological tests as for the items on the display folder. The psychological tests, while considered an important source of clinical information for psychologists, did not seem to warrant categorization into separate items on the display folder in a problem solving task designed for psychiatrists and social workers as well as psychologists. The fact that different psychological tests were administered to each of the four patients further complicated matters.

Most psychologists selected Item 40 (Psychological tests administered) before asking to examine a particular psychological test (see Fig. 2, p. 39).

Other psychologists quite spontaneously asked to examine a specific psychological test, and even after reference to Item 40, expressed no interest in examining other available test data. These individual differences between psychologists were recorded qualitatively but could not be combined with quantitative differences between items selected from the display folder for the computation of Utility Indexes, Utility Scores, Pattern Analysis, etc., since there is no way of knowing if the psychologists would have shown similar behavior had they known which tests were available by simply glancing at the display folder. An alternative experimental design to preclude analogous scoring problems in future studies is presented in the summary section of this paper. However, certain scoring conventions were introduced in the present study to show both the complexity and the significance of individual differences between psychologists in their use of test data in forming a diagnosis. These scoring conventions refer to results reported in Table 6, (p. 92).

Note carefully the following description of the relationships shown in Table 6:

> The first column of each case in Table 6 shows the specific psychological tests and the order in which they were examined by each psychologist. In the lowest section of the table, the tests originally administered to each patient have been arranged by category (e.g., intelligence, projective, etc.) insofar as possible for each case. Note especially that the letters A, B, C, etc. may <u>not</u> refer to identical tests in all four cases. Following the usual procedure, the utility index of a specific test in a given case may be obtained by dividing the number of psychologists (n) who examined that test by 20.
>
> The expected value (i.e., anticipated usefulness) of a particular psychological test or combination of tests in comparison to the expected value of items selected from the display folder in forming a diagnosis is shown in the column designated RI. The expected

Table 6

Use and Rank Order Value of Psychological Test Data in Forming a Diagnosis

(Sequence=tests in order of use; RI=expected and RII=actual value in relation to NI [N of items selected])

PO	Case A				Case B				Case C				Case D			
	Sequence	RI	NI	RII	Sequence	RI	NI	RII	Sequence	RI	NI	RII	Sequence	RI	NI	RII
1									B	10	27	11	B	10	11	6
2																
3																
4	A-B	27	27	1	A-C	23	23	23	A-C-B	28	28	.5				
5	A-B-C	5	16	1	A-B-C-D-E	4[a]	19	1	A-B-C	3	18	6	A-B	3	7	3
6																
7	A-B-C	36[a]	61	5	A	27	60	13	C-A-B	42	47	8[a]	A-C-D-B	34	44	2[b]
8	B-C	28	36	4	B	3	13	11	B	6	17	7	B-A	14[a]	29	7[a]
9	B-C-A	5	17	1	B-D-A	3	14	3	C-B	3	24	3	A-D-C-B	3	19	2
10	B	22	29	3	B-A	5	6	3	A-C-B	12	26	14	A-B	15	17	9
11	B-C-A	31	33	.5[a]	C-B	36	38	6	A-C-B	43	43	.5	C-D-B-A	41	41	.5[a]
12					A	21	26	2	B	25	25	17				
13	C-A-B	49	52	3	C-B-A	24	24	.5[a]	A-C-B	24	25	3	C-D-A-B	28	29	.5[a]
14									B-C-A	28	32	5[a]	D-A-C-B	18	21	3[a]
15	A-B-C	9[a]	24	.5[a]	A-B-D-C	13	14	1[a]	A-C-B	13	18	1	A-D-C-B	13	15	1[b]
16	B-A	8	42	1	A-B-C-D	6[a]	21	8	A-B-C	3	42	30	A-C-D-B	11	47	18[b]
17	C-A-B	3	53	7	A-C-D	1[a]	7	3	A-B	1	5	2	A	1	10	4
18	B-C-A	28[a]	44	6[a]	B-A-C	1	38	.5	C-B-A	2[a]	43	.5	A-C-B-D	1	51	.5[a]
19	B-A	15	19	3[a]	C-B	6	16	9					A-D	11	18	15
20	A-B-C	3	15	.5	A-C-B	1	21	.5	A-C-B	1	31	.5	A-D-C-B	2	31	.5

Tests Administered	n	Tests Administered	n	Tests Administered	n	Tests Administered	n
A=WISC	12	A=Stanford Binet (L)	12	A=Stanford Binet (L)	12	A=WISC	14
B=Rorschach	14	B=Rorschach	11	B=CAT	16	B=Rorschach	13
C=Draw-A-Person	10	C=Draw-A-Person	10	C=Draw-A-Person	12	C=Draw-A-Person	9
D=Detroit Learning	0	D=Ontario Designs	5			D=Bender Gestalt	10
E=Gray Oral Reading	0	E=Gray Oral Reading	1				
F=Kent EGY (B and C)	0						
G=Cal. Achieve. (AA)	0						

Note.—Add .5 to each rank except .5. The .5 rank shows test data contributed most to primary diagnosis.

[a] Higher of two ranks showing differences between tests in RI or RII rank order. See text.

[b] Higher of three ranks showing differences between tests in RI or RII rank order. See text.

value of each test was defined as a rank order position midway (.5) between the item selected from the display folder just before the psychologist asked to examine the test data and the item selected immediately after the psychologist examined the test data. When the subject completed his diagnosis, he was asked to re-arrange the items in terms of how much each had actually contributed to his primary diagnostic conclusion (this rank is designated RII). In the RII rank, the test(s) were assigned a rank order position midway between one item judged as more helpful and one item judged as less helpful. Note that both RI and RII are in relation to the total number of items (NI) each psychologist selected on a given case.

The RI rank order represents the point in each psychologist's acquisition of information at which he felt that the psychological test(s) could answer some question about the patient that the items on the display folder could not. This may be viewed as the "expected" value of a particular test or group of tests in relation to other types of information the psychologist could gain from the display folder. The [a]referent in the RI column means that one or more of the tests were examined at two <u>different</u> points in the subject's acquisition of information. Thus, some tests had a higher expected value than others. The [b]referent means that one or more of the tests were examined at three different points. Only the higher of the two or highest of the three rank order positions are shown in Table 6 to point out the differences between the expected value of psychological tests and the items of information on the display folder.

The RII rank order, in contrast, represents how valuable the subject felt the tests to be in terms of his own final diagnosis. The .5 entries in the RII columns indicate that these psychologists considered the psychological test data the most helpful in forming their final diagnostic conclusions. The [a] and [b]referents in the RII columns are similar in meaning to those in the RI column except that one or more of the tests was judged as more helpful than the other tests in leading the subjects to his final diagnosis.

The rather complex relationships shown in Table 6 may be more clearly understood by an example. Note the use of psychological test data by PDs 11 and 15 in Case A. Both Psychologists examined the WISC, Rorschach, and Figure Drawings originally administered to this patient, but in an entirely different order and at equally dissimilar points in comparison to the number

of items selected from the display folder before and after the psychological test data were considered potentially valuable in forming a diagnosis. Observe that PO 11 expressed little interest in the test data until the final stage of his diagnostic appraisal of this patient. He then examined all three tests at once. PO 15, on the other hand, became interested in the patient's WISC and Rorschach rather early in his diagnostic approach and rather casually glanced at the Figure Drawings some time later. Although PO 11 considered the Rorschach of more help than the WISC or Figure Drawings, both psychologists considered insights derived from psychological test data of more help in forming a diagnostic conclusion about this patient than any of the knowledge they had gained from the items on the display folder.

In more general terms, it may be stated that twelve psychologists used at least one test in forming a diagnosis for all four patients. Five other psychologists used at least one test in either two or three cases. It is extremely interesting to note that the remaining three psychologists (POs 2, 3, and 6) reached a diagnosis on all four cases without recourse to the available qualitative test data in any of the four cases. By reference to the appropriate cell entries in Table 15 (Appendix V, Column 2 in each case), it can be shown that two (POs 2 and 3) of these three psychologists diagnosed all four cases as chronic brain disorders. While this finding is in itself unusual, it takes on added significance in view of two other facts: a) of the twelve psychologists who used tests in all four cases, only two (POs 5 and 7) diagnosed all four patients as chronic brain disorders. While this is clear-cut and undeniable evidence that similar diagnostic conclusions about a given type of clinical patient may be reached by members of the same discipline

through markedly dissimilar mental processes, it is equally important to point out that the essential difference in the mental approach of these two pairs of psychologists is found in the one area of diagnostic thinking in which differences would be least expected in view of their professional training, viz. their unique competence in appraising psychological test evidence to substantiate or nullify suspected minimal organic brain pathology.

By diagnosing each patient as a chronic brain disorder, these two pairs of psychologists showed a consistency in diagnostic conclusions in spite of their completely dissimilar (but equally consistent) employment of psychological test data. Table 7 presents further comparisons between those psychologists who consistently used qualitative test evidence and those psychologists who consistently disregarded such evidence in terms of the number of patients diagnosed as chronic brain disorders by each group.

Table 7

Consistent Use or Non-Use of Qualitative Test Evidence in Relation to Number of Patients Diagnosed as Chronic Brain Disorders

Groups	Totals	Number of Patients Diagnosed as Chronic Brain Disorders				
		4	3	2	1	0
Psychologists Using Tests in All Cases	12	2	1	1	5	3
Psychologists Using No Test in Any Case	3	2		1		

By adding the cell entries in the last two columns of Table 7 (i.e., 5 + 3 = 8), it can be seen that a majority of the 12 psychologists who consistently used qualitative test evidence in forming a diagnosis tended to reach some diagnosis other than chronic brain disorder in three or four of the cases.

From another point of view, it may also be said that the total number of psychologists who diagnosed any one case as a chronic brain disorder (refer to row 2, second column in each case in Table 5) includes at least two psychologists who reached this diagnosis without a qualitative appraisal of psychological test evidence. Another fact that is not directly shown in Table 7 is that the three psychologists who used tests in all four cases but did not diagnose any patient as a chronic brain disorder (row 1, column 6) are the only psychologists who did not diagnose at least one patient as a chronic brain disorder. It is perhaps important to point out that the psychologists in Table 7 followed no definite pattern in terms of agency affiliation (i.e., LJR or Non-LJR) or amount of clinical experience with children.

What inferences can be drawn from these facts to explain the two consistent trends in interdiscipline differences thus far observed, that is, the greater economy with which the psychologists proceeded to diagnose all four cases, and the greater weight they placed on the organic factors in all four cases? Only four psychologists diagnosed all four cases as chronic brain disorders. However, two of these employed qualitative test data in combination with other evidence, while the other two limited their evaluation to the same domain of clinical information (i.e., items on the display folder) that psychiatrists and social workers employed in reaching a diagnosis.

Three other psychologists employed the test data in all four cases but did not diagnose any patient as a chronic brain disorder. Hence, the mere fact that a psychologist might be able to determine the relative importance of organic factors by using test evidence cannot completely explain the lower overall amount of clinical information psychologists needed (i.e., that they proceeded with greater economy) to reach a diagnosis. More significantly, the fact that psychologist attributed greater importance to the organic factors throughout the four cases than psychiatrists or social workers cannot be said to be due solely to the specific insights they could gain by a qualitative appraisal of test data.

The above findings tend to support the author's assumption that factors other than technical clinical skills (and related to the professional training of a particular discipline) may also account for that discipline's sensitivity in discerning organic factors, and their capacity to proceed through the present diagnostic tasks with a minimum of redundancy or repetition of fruitless leads. Personality factors and other nonintellective factors might also be postulated to account for the consistent differences between psychologists and the other two disciplines, although this seems less likely in view of the fact that the cases themselves differed in complexity. Whatever the reasons for these differences may be, however, it is the purpose of the present study to demonstrate their existence and their accessibility through a detailed analysis of the diagnostic approach of each discipline in cases of minimal intracranial pathology.

The discussion in this section has proceeded from general to rather specific and detailed distinctions in the diagnostic approach of

psychologists to point out the potential value of the technique employed in this study as a way of clarifying some of the numerous problems involved in the diagnosis of children with minimal intracranial pathology. A detailed analysis of their conceptual approach revealed several variations in thinking which could be related to their theoretical orientations and professional training.

These variations do not seem to be as important in themselves as for what they imply concerning the diagnostic process in general with these types of cases. There is evidence to show that the ability to discern the importance of organic factors involves certain limitations in assuming the validity of insights each member of the clinical team can gain from his own clinical skills in a specific brain-damaged case, regardless of their general applicability in similar cases. This ability also seems to require a capacity to economically integrate clinical information from other disciplines. It is only in this narrow way that the psychologists may be said to have shown relatively greater efficiency than psychiatrists and social workers in the present study.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The present study represents an adaptation of a technique originally devised to appraise mental processes in medical diagnosis to the diagnostic problems involved in minimal organic brain pathology in children. The problem as conceived was basically exploratory and represented an attempt to investigate whether the three disciplines comprising the typical child guidance clinical team (i.e., psychiatrists, psychologists, and social workers) would reflect differences inherent in their training and possible theoretical frames of reference in their diagnostic approach to cases previously diagnosed as chronic brain disorders. A preliminary review of literature on the diagnostic process in general suggested that each discipline would probably express its unique diagnostic approach to such cases in a problem solving task which would parallel the original diagnostic procedures employed in as many ways as possible, but would place each group of subjects in a position of evaluating the importance of organic factors within the framework of the knowledge of their own discipline. The author's first task, then, was to acquire clinical cases that exemplified the diagnostic problems involved in minimal chronic brain disorders in children.

A fairly extensive review of the literature pertaining to such diagnostic procedures failed to disclose a single diagnostic criterion

to discriminate children with minimal organic brain pathology from cortically intact children with satisfactory reliability. This finding seemed to make the present study all the more necessary on the one hand, but all the more complex on the other. The rationale developed by Rimoldi and his associates at Loyola seemed applicable to the author's purpose in that emphasis is not placed on the end product, but on the mental processes followed in clinical diagnosis. At this point, the study took on some of the aspects of what Rimoldi has described as a problem for which ". . . the correctness of the final answer is impossible to assess . . . at the present time" (1960a, p. 453). Rimoldi goes on (1960a, pp. 453-458) to suggest several ways in which this technique may be of particular value in problems of this kind in that it permits an analysis of individual and group differences in conceptual approach.

The lack of reliable criteria, however, provided additional complications in selecting clinical cases as well as constructing a problem solving task that would reflect both the diagnostic problems and the role of professional training in the evaluation of minimal organic pathology. Further, in respect to whatever differences might result from their various frames of reference, the absence of reliable criteria suggested that a given clinician's overall amount of clinical experience with children might be only one of several factors that could account for intra- and interdiscipline variations in diagnostic approach. All of these factors re-emphasized the importance of an empirical approach in attempting to parallel the original diagnostic procedures with a given clinical case.

At least some of these difficulties were anticipated and the author was

indeed fortunate in having the expert counsel of not only Dr. Rimoldi but of three well-experienced members of these disciplines at LJR. Moreover, a large pool of clinical cases were available following an earlier compilation of LJR records in which the organic factors were rather deceptive and obscure. Following Dr. Rimoldi's suggestion to limit the number of cases to four, the author reviewed 118 cases and finally selected three originally diagnosed as "Chronic brain syndrome of unknown or unspecified cause" and a fourth diagnosed as "Chronic brain syndrome associated with convulsive disorder". These cases represented a rather narrow age range (8-10). The primacy of organic factors had been based on evidence in the history, EEG results, and qualitative psychological test results. All four children had been examined by neurologists, but only one examination (in Case D) disclosed neurological impairment. Skull x-rays were available in Cases A and D, but were positive only in Case D. All four children were of at least average intelligence on individual tests of mental ability (IQs ranged from 88 to 109).

The selection and phrasing of items for a display folder that would categorize the information for all four cases was based on both general areas of information routinely obtained by each discipline at LJR and other child guidance clinics and specific items that were unique to, but of significance in, the four cases selected. The general rule the author followed was one of replicating the actual clinical information obtained in each of these cases with the important exclusion of interpretive comments by the original examiners. The assistance of the three LJR consultants were of particular value here. The items and the information were then discussed in detail with Dr. Rimoldi and the final set of test items for the display folders were

developed.

The only limitation placed on subjects was that they be of at least the same level of training and clinical experience within their own discipline as the original examiners. The psychiatrists had slightly less clinical experience than the other two groups, due mostly to the fact that the original psychiatric examiners were either residents of fellows in training at LJR and to the fact that the author had access to a similar group of trainees. However, almost half of the psychiatrists in the present study were experienced staff members or consultants at LJR. The psychologists from LJR were limited in number for several reasons and more than half of their group were obtained from other agencies. Later investigation of possible effects of this factor proved negligible. Limitations inherent in the number of subjects and cases obviously qualify the applicability of all findings in this study.

The results were initially discussed in terms of group differences in the number of items selected, the utility indexes for the various items, utility scores and performance curves in each of the four cases. Two trends became apparent in analyzing these results.

The first trend showed the composite unity of the clinical team. Although the disciplines differed widely in some ways, their uniformity of agreement in such factors as the number of items selected on a given case (with the possible exception of Case A) and their different approaches to different cases confirmed both the wisdom and the interdependence of the team approach in this complex type of clinical case. Since Case A differed from the other three cases in a number of ways, a pattern analysis was performed. Although the model pattern for each discipline (against which that

discipline's observed pattern of item selections was compared) actually varied considerably from the model patterns of the other disciplines in Case A, the indexes of agreement were remarkably similar for all three disciplines. These results were interpreted as a reflection of each subject's conformity to a pattern of item selection specified by the group to which he belonged and a uniformity among all three disciplines in the extent to which individual members deviated from their own group, at least in Case A.

The second trend was itself twofold. The diagnostic approach of psychologists consistently differed from both psychiatrists and social workers, although the differences were generally of greater statistical significance between psychologists and social workers than the differences between psychologists and psychiatrists. Social workers and psychiatrists, on the other hand, interestingly disclosed a number of similarities in theoretical orientation.

The form of this second trend in terms of mental processes was that psychologists characteristically proceeded to reach a diagnosis in each case with less repetition of overlapping items and a corresponding economy in acquiring information that served to establish the importance of organic factors in each case. It is very interesting to note that the specific items that consistently differentiated psychologists from the other two disciplines (i.e., interview and history data) are very similar to the type of items that have been shown to most clearly distinguish the diagnostic approaches of juniors, seniors, and experienced physicians in two Tests of Medical Diagnostic Skill (Rimoldi & Devane, 1960b). In the present study, these differences in conceptual approach were strikingly evidenced in an analysis of

the height and slope of individual performance curves for six subjects in Case A.

In his rationale for determining and comparing the relative importance of organic factors in each subject's (discipline's) diagnostic conclusions, the author does not maintain that there is or should be a simple dichotomy between "emotional" and "organic" factors, although this is perhaps not clearly denoted in the section on diagnostic conclusions. The comparative emotional adjustment of each of these children was an object of concern in their original diagnostic workup at IJR and constituted a conspicuous part of the problem solving tasks in the present research. In keeping with the primary goals of the present study, however, the author has made no attempt to describe the differences between these four children in their effective adaptation to their organic handicaps, or to point out emotional factors within the home which probably itensified the debilitating effects of such handicaps. But the implication that emotional factors were not important in each case should not be drawn. Rather, it is precisely because emotional factors were significant, or, better, that a certain sequence of item selections would stress their importance, that the author seemed justified in assuming that a subject's primary diagnosis reflected the relative importance of organic factors in his thinking. Hence, a given subject's diagnostic conclusion on each case was described in one of two ways: if he diagnosed the patient as a chronic brain disorder, he considered the organic factors of primary importance; if he diagnosed the patient with some diagnosis other than chronic brain disorder, he did not consider the organic factors of primary importance. While there may be some question as to how well this rather

specific channelization of a number of clinical insights about each patient actually represents a given subject's terminal diagnostic thinking, there seems to be less error in following this procedure than for the author to have rated (or have the subject rate his own) degree of certainty about "possible organicity" in each diagnostic conclusion, especially since such a rating procedure could establish a set for the other cases. Moreover, it seems improbable that a rating procedure would provide additional knowledge about a subject's terminal diagnostic thinking if organic factors were in question. To ask the subject to rate his primary diagnosis as more or less "certain," for example, would seem to be asking for knowledge already obtained by his spontaneous verbal admission of confusion or indecision on the possible importance of organic factors. The spontaneous comments of the subjects while acquiring clinical information as well as the results of the structured inquiry which was employed under certain conditions seem to support to the author's rationale in viewing a subject's primary diagnosis as a reflection of the importance of organic factors in that subject's thinking. However, further research may lead to more refined ways of categorizing solutions in problem solving tasks of this type without interfering with the spontaneous dynamics involved.

The psychologists as a group consistently considered organic factors of greater importance throughout the four cases than psychiatrists or social workers. The author pointed out several factors relevant to the professional training of each discipline that could conceivably account for these discrepancies, but these factors were presented as hypotheses for future research rather than direct conclusions warranted by the present results.

The fact that the psychologists differed so consistently from the other two disciplines, however, as well as certain unresolved questions on the relationship between these consistent differences and a psychologist's unique capacity to evaluate psychological test data, led the author to further explore the diagnostic thinking of individual psychologists with a view toward other potential contributions of the technique employed in this study. Unfortunately, statistical comparisons between the originally-administered psychological tests and those which were employed by psychologists in the current study proved rather awkward since differences between tests could not be directly compared with differences between items from the display folder. Hence, the use of psychological test data was described in all-or-none terms for each one and all four of the cases. The main reason for these scoring problems was that test protocols as such could not be presented in any meaningful way on the display folder. The expected and actual value of particular psychological tests in forming a diagnosis might have been more clearly obtained if a card for each test were included in each display folder, or at least a card for each type of test (e.g. Intelligence test, Projective technique(s), Figure drawing(s) etc.). Perhaps future researchers using the technique employed in the current study can avoid similar scoring problems by including cards which classify all types of available information. In this way, even though a certain block of items require highly specialized knowledge, and may be used by only one group of subjects, a better approximation of how much such items contribute to individual and group differences in conceptual approach may be obtained.

A detailed analysis of the mental approach of psychologists disclosed

several systematic variations in thinking which appeared to be a result of personal and theoretical orientations and which suggested several interesting implications for further research on the relationship between professional training and the diagnostic process with minimally brain damaged children. It was shown that the mere fact that psychological test evidence was available could not account for the economy or for the consistency with which the psychologists as a group discerned the importance of organic factors in each case, since two of the four psychologists who diagnosed all four patients as chronic brain disorders did so without the use of psychological test evidence. Moreover, the majority of psychologists who used tests in all four cases tended to reach some diagnosis other than chronic brain disorder on most of the four cases. Synthesizing a number of qualitative and quantitative results in the present study, the author maintains that the ability to evaluate the relative importance of minimal organic pathology in children involves both: a) the awareness that the kind of clinical insights one can gain from his own area of professional competence may have limited value in a given case, regardless of their general applicability in similar cases; and b) the capacity to effectively integrate and organize clinical information obtained by other disciplines.

The performance of psychologists in the present study has shown that similar "correct" diagnostic conclusions about minimally brain damaged children may be reached by very dissimilar mental processes. The fact that several psychologists ascertained the relative importance of organic factors without the use of psychological tests indicates that the way in which clinical skills are employed may be as important as the skills themselves in the

diagnostic process with minimally brain damaged children. The latter is also evidenced by the diagnostic conclusions of several other psychologists who did use psychological tests, some of whom were as convinced of the organic pathology in all four children as the psychologists who disregarded tests, but others of whom considered emotional factors of greater importance in all four children. These modes of diagnostic thinking probably reflect a number of nonintellective factors, but it is also possible that professional training itself plays a major part in the problem solving ability of individual psychologists in clinical cases of this type. In the current research, it has been shown that if a psychologist used the skills he had obtained in his professional training with an implicit awareness of their strengths and liabilities, he was less likely to reach "incorrect" diagnostic conclusions about minimally brain damaged children.

In conclusion, the author would like to point out several ways in which the results of the present study may be extended in future research with particular reference to the development of more effective modes of diagnostic thinking in the professional training of psychiatrists, psychologists, and social workers. Further efforts should be made to better prepare potential members of these three disciplines to handle diagnostic problems upon which well experienced members of their own profession cannot agree.

It may be inferred from the results of this investigation that the unique contribution of each discipline to the accurate assessment of minimal intracranial pathology at a diagnostic staff conference may well depend on the degree to which each examiner prescinds, or is willing to acknowledge, the <u>relative</u> value of the insights he can gain through his own clinical

skills, partially because the data from which he derives these insights are unreliable and partially because his insights are often colored by his personal frame of reference. More directly, it has been shown that each examiner should be aware of his own and his discipline's limitations in "solving the diagnostic problem" presented by such children during actual clinical contact with the patient, since the insights from which he later derives and formulates a diagnostic impression are themselves limited by the scope, kind, and amount of clinical information he can economically acquire at that time. While these statements are primarily justified by the performance of psychologists in the present study, they seem equally applicable to psychiatrists and social workers, and to potential improvements in the professional training of all three disciplines.

The author sincerely hopes that the results of this study will lead to further efforts to incorporate these modes of diagnostic thinking in the professional training of psychiatrists, psychologists and social workers. As clinical diagnostic procedures become more accurate, the role of organic, emotional, and social factors in the minimally brain damaged child will become more clearly delineated.

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Source (Part), Item Number, and Type of Information on Cards

Source (Part)	Item No.	Type of Information
Social History (I)	1	Mother's description of patient's problems on application blank
	2	Principal informant(s) for social study
	3	Family constellation and sibship
	4	Economic status and living conditions of family
	5	Parental attitude toward pregnancy at time of patient's conception
	6	Type and length of early feeding response
	7	Walking and motor development
	8	Speech development
	9	Toilet training
	10	Sleeping arrangements after infancy
	11	Frequent or prolonged separations of patient from family
	12	Peer and sibling relationships
	13	Sex information given to patient
	14	Mother's description of patient's problem during social study
	15	Father's description of patient's problem during social study
	16	Mother's technique in handling patient from social historian's report
	17	Father's technique in handling patient from social historian's report
	18	Mother's background from social historian's report
	19	Father's background from social historian's report
	20	Relationship between mother and father from social historian's report
	21	Parental expectations of clinic
Medical History (II)	22	Maternal health during pregnancy
	23	Birth conditions
	24	Neonatal anomalies
	25	Infectious diseases during infancy and childhood
	26	Symptoms not usually attributable to infectious diseases
	27	Surgery
	28	Allergies
	29	Accidents or other physical trauma
	30	Physical examination
	31	Evaluation of pathology indicated in the medical history
	32	Response to treatment of pathology indicated in the medical history

(Continued on next page)

Source (Part), Item Number, and Type of Information on Cards (Continued)

Source (Part)	Item No.	Type of Information
School Report (III)	33	Current grade level in school and promotion history
	34	Type of school and length of time in present school
	35	Standardized test results reported by school
	36	Current achievement in school subjects
	37	Individual remedial tutoring in school
	38	Classroom behavior
	39	Role of family in patient's school activities
Psychological Testing (IV)	40	Psychological tests administered
	41	Previous individual psychological testing
	42	Physical appearance of patient according to psychologist's report
	43	Behavioral observations by the psychologist
	44	Relationship with the psychologist
	45	Reactions to specific psychological tests
	46	Intelligence quotients and test scores
Psychiatric Interview (V)	47	Physical appearance of patient according to psychiatrist's report
	48	Relationship with psychiatrist
	49	Specific features of the psychiatric interview
	50	Physical appearance of mother according to psychiatrist's report
	51	Physical appearance of father according to psychiatrist's report
	52	Mother's description of patient's problem during psychiatric interview
	53	Father's description of patient's problem during psychiatric interview
	54	Mother's technique in handling patient from psychiatrist's report
	55	Father's technique in handling patient from psychiatrist's report
	56	Mother's background from psychiatrist's report
	57	Father's background from psychiatrist's report
	58	Relationship between mother and father from psychiatrist's report
Miscellaneous Reports (VI)	59	Home visits by social agency
	60	Individual remedial tutoring outside of school
	61	Previous individual psychotherapy
	62	Social counselor's report

Table 8

Percentage Comparison of Examiner Sex and Level of Training for Original Examiners and Present Study

($N_{Original\ Examiners}$ = 4; $N_{Present\ Study}$ = 20)

Groups	Psychiatrists			Psychologists			Social Workers		
	Sex		Level		Sex	Level		Sex	Level
	M	F	R[a] F[b] M[c]	M	F	MA PhD	M	F	MSW
Original Examiners	100	0	75 25 0	50	50	50 50	25	75	100
Present Study	60	40	40 25 35	55	45	50 50	10	90	100

[a] Residents

[b] Fellows

[c] Moderators

Table 9

Amount of Clinical Diagnostic Experience with Children in Months

(N in each discipline = 20)

Discipline	Range	Mean	S. D.
Psychiatrists	3-144	43.70	40.85
Psychologists	1-180	66.85	57.95
Social Workers	1-221	63.00	48.81

Table 10

Primary Institutional Affiliation of 13 Non-IJR Psychologists

Institution	N
Children's Memorial Hospital, Child Guidance Clinic	3
St. Luke's Presbyterian Hospital, Psychiatry Department	2
Chicago Board of Education, Bureau of Child Study, Behavior Clinic	2
Lake County Mental Hygiene Clinic	1
Northwestern U. Medical School, Psychiatry Department	1
U. of Illinois Medical School, Center for Handicapped Children	1
Mercy Hospital, Psychiatry Department	1
Evanston Hospital, Psychiatry Department	1
Evanston Public School System	1

Table 11

Academic Institution Granting Highest Professional Degree

Psychiatrists		Psychologists		Social Workers	
Institution	N[a]	Institution	N	Institution	N
U. of Illinois	5	U. of Chicago	8	U. of Chicago	10
U. of California	1	Loyola U. (Chicago)	4	Smith College	5
Chicago Med. School	1	U. of Illinois	2	Simmons College	2
Marquette U.	1	Ill. Inst. Technol.	1	Loyola U. (Chicago)	1
Meharry Med. School	1	Indiana U.	1	U. of Minnesota	1
U. of Minnesota	1	Northwestern U.	1	Washington U.	1
Northwestern U.	1	Purdue U.	1		
U. of Wisconsin	1	U. of Denver	1		
Women's Med. College	1	U. of Florida	1		
Yale U.	1				

[a]Does not include six psychiatrists who received their medical degrees from one of six following foreign medical schools; U. of Alexandria (Egypt); U. of Budapest (Hungary); U. of Frankfurt (Germany); U. of Havana (Cuba); U. of Heidelburg (Germany); and U. of Toronto (Canada).

Table 12

Utility Indexes

Item	Case A			Case B			Case C			Case D		
	PI	PO	SW	PI	PO	SW	PI	PO	SW	PI	PO	SW
1	.95	.55	.75	.90	.55	.80	.85	.55	.55	.90	.45	.65
2	.35	.00	.55	.35	.05	.30	.25	.00	.25	.40	.20	.35
3	.95	.70	.80	.80	.50	.65	.75	.45	.60	.75	.60	.90
4	.60	.20	.40	.20	.05	.15	.20	.15	.30	.55	.25	.40
5	.70	.25	.65	.45	.30	.35	.55	.25	.60	.35	.20	.40
6	.75	.40	.70	.35	.20	.40	.55	.30	.45	.30	.10	.35
7	.85	.70	.80	.60	.55	.50	.70	.55	.60	.50	.30	.45
8	.70	.65	.80	.55	.50	.60	.75	.75	.80	.45	.30	.35
9	.65	.45	.65	.50	.25	.30	.55	.40	.40	.60	.45	.80
10	.55	.25	.50	.25	.20	.20	.50	.30	.40	.30	.15	.50
11	.60	.30	.45	.50	.25	.45	.60	.20	.35	.60	.50	.70
12	.75	.50	.75	.60	.30	.35	.65	.40	.60	.55	.40	.45
13	.45	.30	.45	.10	.15	.20	.25	.20	.45	.25	.20	.45
14	.85	.55	.95	.55	.40	.95	.60	.50	.90	.65	.55	.95
15	.65	.50	.90	.40	.20	.65	.60	.25	.55	.55	.35	.70
16	.75	.45	.95	.55	.25	.70	.70	.50	.85	.50	.40	.90
17	.65	.30	.70	.30	.20	.45	.50	.20	.55	.35	.35	.85
18	.55	.30	.65	.40	.15	.55	.65	.25	.70	.45	.45	.70
19	.55	.25	.60	.20	.10	.45	.45	.25	.45	.40	.25	.60
20	.70	.35	.80	.35	.15	.60	.55	.30	.75	.60	.50	.85
21	.30	.30	.15	.25	.15	.25	.25	.05	.10	.25	.05	.15
22	.65	.35	.55	.35	.30	.20	.30	.20	.35	.35	.35	.25
23	.90	.75	.75	.80	.60	.55	.55	.45	.50	.70	.50	.40
24	.80	.70	.45	.45	.45	.30	.40	.40	.30	.30	.35	.20
25	.75	.90	.65	.55	.60	.45	.40	.40	.30	.45	.35	.20
26	.70	.55	.50	.45	.35	.35	.30	.45	.40	.55	.50	.30
27	.60	.45	.50	.25	.25	.20	.20	.20	.15	.25	.25	.20
28	.30	.25	.20	.15	.15	.15	.50	.30	.30	.20	.15	.10
29	.75	.85	.70	.40	.50	.60	.35	.45	.35	.60	.55	.45
30	.85	.85	.65	.70	.80	.75	.60	.80	.60	.75	.80	.65
31	.95	1.00	.80	.70	.95	.85	.65	.85	.60	.75	.80	.60

(Table continued on next page)

Table12 (Continued)

Utility Indexes

Item	Case A			Case B			Case C			Case D		
	PI	PO	SW	PI	PO	SW	PI	PO	SW	PI	PO	SW
32	.65	.70	.60	.35	.60	.45	.40	.45	.35	.55	.65	.55
33	.70	.55	.70	.40	.20	.30	.50	.30	.35	.50	.35	.50
34	.55	.20	.30	.15	.05	.10	.25	.25	.15	.05	.10	.15
35	.40	.50	.35	.25	.20	.15	.30	.35	.30	.10	.30	.20
36	.50	.55	.45	.20	.25	.30	.45	.60	.55	.30	.40	.50
37	.35	.20	.20	.10	.15	.10	.10	.15	.15	.05	.05	.00
38	.95	.90	.75	.60	.60	.55	.85	.75	.60	.55	.75	.65
39	.45	.20	.30	.05	.05	.15	.20	.00	.10	.25	.05	.30
40	.70	.85	.60	.35	.80	.35	.50	.90	.35	.50	.85	.30
41	.45	.60	.30	.30	.45	.30	.35	.55	.45	.25	.35	.10
42	.45	.45	.15	.20	.15	.35	.25	.40	.15	.35	.25	.20
43	.90	.75	.70	.55	.75	.70	.65	.80	.75	.60	.75	.80
44	.50	.45	.40	.35	.50	.40	.45	.60	.35	.30	.60	.45
45	.70	.55	.50	.60	.30	.45	.60	.55	.70	.55	.60	.65
46	.90	.75	.90	.65	.65	.60	.85	.80	.85	.80	.60	.80
47	.70	.45	.25	.30	.20	.35	.25	.35	.45	.30	.25	.30
48	.90	.45	.70	.60	.50	.55	.65	.55	.55	.60	.55	.70
49	.95	.65	.95	.85	.80	.80	.90	.80	.85	.85	.75	.75
50	.35	.20	.15	.10	.00	.15	.15	.00	.15	.15	.10	.10
51	.40	.20	.15	.05	.00	.15	.25	.00	.15	.20	.10	.10
52	.85	.70	.65	.35	.45	.45	.70	.70	.55	.55	.65	.50
53	.85	.70	.60	.30	.40	.30	.60	.45	.30	.60	.65	.60
54	.75	.60	.50	.35	.35	.40	.55	.45	.60	.60	.35	.45
55	.65	.50	.50	.15	.20	.30	.50	.35	.30	.50	.30	.55
56	.70	.30	.50	.25	.20	.20	.50	.10	.40	.15	.20	.30
57	.65	.20	.40	.15	.15	.15	.40	.20	.20	.20	.30	.25
58	.85	.55	.65	.35	.30	.30	.75	.55	.55	.65	.45	.45
59	.35	.25	.25	.10	.10	.10	.15	.05	.00	.15	.00	.05
60	.40	.30	.15	.05	.10	.05	.10	.25	.05	.10	.00	.00
61	.40	.45	.50	.25	.25	.20	.35	.45	.55	.20	.05	.15
62	.30	.45	.30	.05	.15	.05	.45	.65	.85	.15	.15	.15

Table 13

Values of F and t in Interdiscipline Comparisons of Utility Scores

Disciplines	Case A		Case B		Case C		Case D	
	F	t	F	t	F	t	F	t
Psychiatrists-Psychologists	2.210[a]	4.230**[b]	1.411	1.111	1.337	1.376	1.253	1.167
Psychiatrists-Social Workers	1.232	3.937**	1.221	.358	1.140	.481	1.104	1.695
Psychologists-Social Workers	2.725*	1.304	1.146	.778	1.173	.893	1.383	2.778**

[a] PO > PI: $p < .05$
PO $\not>$ PI: $p > .05$

[b] $p < .01$ with and without correction for significant F

* $p < .05$

** $p < .01$

Table 14

Correlations Between Utility Scores and Number of Cards Selected

Discipline	Case A	Case B	Case C	Case D
Psychiatrists	-.967	-.950	-.862	-.939
Psychologists	-.965	-.895	-.729	-.880
Social Workers	-.887	-.877	-.927	-.911

Table 15

Original and Obtained Psychiatric Diagnoses

(Underlined entries indicate use of structured inquiry to clarify subject's diagnosis)

	Case A			Case B			Case C			Case D		
Staff Diagnosis	19.40			19.43			19.43			16.02		
Subject	PI	PO	SW	PI	PO	SW	PI	PO	SW	PI	PO	SW
1	10.00b	19.43	40.60	19.41	10.01	19.43	62.20b	40.60b	19.40	16.02	51.10	51.10b
2	51.10	19.40	51.30a	22.70	19.40	19.41	53.00	19.40	51.10b	51.10	16.03	51.30b
3	10.00	19.43	40.00	22.70	19.41	22.70	51.10b	19.43	53.10	51.10a	16.03	53.20a
4	12.03	19.42	53.00	22.70	19.41	22.70	51.30	19.40b	51.10	51.10b	14.02	54.30
5	14.53	19.40	40.20	22.70	19.41b	22.70	40.60	19.43	53.10	51.10	19.40	53.20b
6	51.10a	52.10	53.00	22.70	10.01c	19.42	53.10	51.10b	40.20	54.30a	16.03	54.30
7	53.00	19.43b	40.00b	22.70	19.41a	22.70	22.70	19.43	40.60c	53.20	16.02	51.10
8	10.03	51.10b	16.02b	22.70	22.70	53.00a	53.10	53.10	22.70	51.00	40.60	19.12
9	19.43	16.02b	40.60	22.70a	16.03	22.70a	51.10	22.70	19.43	54.30a	16.03b	51.10a
10	12.03	51.30a	40.00a	22.70	22.70	22.70	50.40b	51.30a	40.60	16.03b	51.10	51.10
11	19.43	50.10a	19.32	19.43	22.60a	22.70	19.43	19.42a	53.10	16.03	51.30a	19.43
12	50.40a	51.10	19.43	22.70a	14.03	19.41	51.10b	53.10	40.60b	54.30a	51.10	51.10
13	10.03	50.40a	40.00	22.70	22.70	22.70	51.00	54.30a	62.20a	52.00a	14.13b	51.10
14	50.40b	10.03	40.60	22.70	50.10b	22.70a	51.30b	40.60b	53.10	40.00a	16.00b	40.00
15	19.43	51.00b	53.00c	22.70a	22.70b	14.03	51.10b	40.60b	53.10	19.33	19.43	51.10
16	19.43	19.31	40.60	22.70a	22.70a	22.70a	53.10a	40.60	19.42	51.10a	17.32	51.00
17	14.13	51.00a	40.60	22.70a	50.10	40.00	51.10	40.40	51.20b	14.13b	51.00	51.00a
18.	14.52	50.40a	22.70a	22.70	19.41	22.70a	51.10b	19.43	50.40	40.00a	51.10a	51.10a
19	19.33	19.43	51.30	19.41	22.70	22.70	53.10a	40.60b	51.30b	16.03b	50.40b	40.60b
20	22.70a	51.00a	40.00	22.70	22.70	50.10	52.10b	54.30a	54.30b	52.00b	54.30a	40.00a

[a] Organic factors considered secondary but contribute to primary diagnosis

[b] Emotional factors considered secondary but contribute to primary diagnosis

[c] Other forms of pathology considered secondary but contribute to primary diagnosis

APPENDIX V

APPROVAL SHEET

The dissertation submitted by John Webb Mohrbacher has been read and approved by a board of five members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the dissertation is now given final approval with reference to content, form, and mechanical accuracy.

The dissertation is therefore accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

Nov 4/60
Date

Signature of Adviser